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THE TREATMENT OF CATARRHAL DISEASES OF THE UPPER AIR PASSAGES.

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BY NORVAL H. PIERCE, M.D.,

SURGEON TO THE NOSE AND THROAT CLINIC, MICHAEL REESE HOSPITAL, OUT-DOOR DEPARTMENT, CHICAGO, ILL.

I pray you bear with me if, in the beginning of this paper, I present a matter which may at first seem irrelevant to the subject. My excuse is three-fold: First, that the condition referred to is frequently a cause of nasal and laryngeal disease; second, that it is of frequent occurrence; third, that its importance is often overlooked. I refer in this to the inspiratory collapse of the alæ nasi in persons enjoying fair health—a sucking in of wings of the nose at each inspiration. I say in fair health to distinguish the same phenomenon as it occurs *in extremis*.

The literature on the subject is peculiarly scant. Traube describes a case occurring during pneumonia and one in paralysis ascendans; B. Frankel, in a child suffering from meningitis. In Traube's cases the hinderance to air was so great that he employed a hair pin held in place by means of adhesive plaster to overcome it. Frankel employed an ear speculum. Drayton (*Med. Record*, Dec. 15, 1888) reports a cure in the case of a pupil in vocal culture by means of a cotton pledget and message. Zeim also reports a case. Latterly I am not aware of any additions to the subject, with the exception of the masterly contribution by Mortz Schmidt (*Ueber das Ansaugen der Nasenfugel, Deutche Mediscinischer Wochenschrift*, No. 4, 1892), to whom I owe much of my knowledge of this condition. He accounts for the scant observations on the subject by the fact that we are accustomed to at once introduce the nasal speculum in beginning our examinations without at first observing the alæ of the nose. We have, however, only to request our patients to take a full breath before introducing the speculum to find how frequently this condition, in a greater or less degree, occurs, and that a convergence which furnishes an absolute hinderance to the full respiratory act is not by any means seldom, in which cases the patients express relief if the alæ are simply held outward with the fingers.

The condition is made still worse when there exists at the same time a deviation of the septum cartilgineum. The convergence includes the entire alæ as in facial paralysis, or only the plica vestibuli. The former occurs most frequently in those of a dolichocephalic type, the latter in the brachycephalic.

The cause of this condition is to be found in an atonic condition of the nasal wall from loss of function of the musculi-dilatores et lavatores alæ nasi. This weakness is in turn caused by all those long continued conditions which setting in at an early age interfere with nasal respiration, whereby the muscles have not sufficient exercise. Adenoid vegetations are a prominent cause of this.

Now as to the philosophy of this in connection with nasal or laryngeal diseases. We must first understand that the beginning of the respiratory track is at the entrance of the nose and not at the larynx; and that behind every constricted point in the entire track from the entrance of the nose to the finest alveoli there is a rarefaction of air during every inspiration. The degree of rarefaction varies in ratio, to the extent of the constriction and the force of inspiration. The natural effect of this rarefaction is a suction which is exerted upon the blood within the domain of such rarefaction, and which is made manifest to us by a local hyperæmia of the mucous membrane and consequent excessive secretion.

Respiratory convergence of the wings of the nose may give rise to nearly all the phenomena arising from contraction of any other part of the respiratory tract, migraine, aprosexia, asthma, etc. Usually the influence is exerted directly on the mucous membrane of the nose, cavum or pharynx, producing redness, swelling of the mucous membrane, and increased secretion of mucus. Tinnitis aurium is not infrequently caused by congestion of the mucous membrane lining of the cavum, which congestion, if dependent upon convergence of the alæ of the nose, may be relieved by preventing the latter condition. It is true that the conditions of the mucous membrane enumerated may have existed for so long a time that they may require direct treatment, but I have relieved some troublesome cases with swelling of the turbinated bodies accompanied by secretion, headache, etc., by means of the simple but eminently effective instrument which I will now speak about.

The treatment is simple. Schmidt has tried gymnastics of the nasal muscles, but has given it up as unsatisfactory. He has used the Feldbaush tubes for a long time with satisfactory results, but they cause a certain amount of irritation from pressure on the septum. Feldbausch, on the suggestion of Schmidt, has produced the instrument which I hold in my hand and which is quite satisfactory. They are of course made in different sizes to fit different noses. It is held in place by introducing the heads from behind into the pocket at the end of the nose, when the spring is pressed up against the alæ of the nose, the connecting part resting on the septum cutaneum.

Acute Rhinitis.—During the trying weather of the past winter we have had ample opportunity of treating coryza. The symptoms have not varied from the well known ones of slight pyrexia, lassitude, chilliness, frontal headache, blocking up of the nose, with swelling of the mucous membrane, hypersecretion, etc. The treatment which we have

employed has proven most satisfactory. Internally we have given large doses of bromides, or a tablet compounded after the formula of Dr. Lincoln, consisting of camphor, gr. ¼, fluid ex. belladonna gr. ⅛, quin. sulph. gr. ¼, one every hour. The local application by means of the cotton carrier of cocaine dissolved in tinct. belladonna in from three to five per cent. solution has been especially useful in immediately relieving the most prominent symptoms, *i.e.*, turgesence of the mucous membrane, frontal headache, and throbbing in the nose. We believe that such treatment shortens the duration of all cases of coryza and in some cases seems really to abort the attack. If there is a predisposition against cocaine we may use tinct. belladonna, alone applied on the cotton carrier. We have not lost sight of the fact that chronic rhinitis in the beginning results from relapsing acute attacks and have retained the patients under observation until the turbinated bodies returned to a normal condition.

For this purpose we have used nearly the same treatment as that employed in simple chronic rhinitis. In this the most prominent position is given to the nasal bath. The ingredients used and the mode of employment are simple and effective. A half teaspoonful of salt and a half teaspoonful of glycerine are dissolved in half a glass of warm water.

Take a teaspoonful of this mixture, rest the point of the spoon on the lower part of the nostril, slowly throw the head backward, saying at the same time a continuous "ah," and allowing the fluid to gently run into the nose. Then incline the head forward and the fluid will run out. Repeat this in each nostril three or more times night and morning. The sodium chloride has a soothing effect upon the mucous membrane; the glycerine a mildly depleting action; the water is cleansing. I have lately had constructed a glass receptacle in the shape of a covered spoon having a spout which faciliates the taking of the bath. Douches are never allowed in any form of simple chronic rhinitis. Not because we believe they are potent in causing disease of the middle ear but because of their local effect on the turbinated bodies. We are convinced that they increase rather than diminish the hyperemia present in simple chronic catarrh and that they aid the hypertrophic process toward which simple chronic rhinitis has always a strong tendency. Very frequently the nasal bath is all the treatment required. In other cases it may be necessary to use sozo iodide of zinc in sugar of milk, $\frac{1}{10}$; this especially in catarrh of the cavum where decomposition of secretion is very liable to occur. Or we may use menthol dissolved in iodine in from two to ten per cent.solution where turgescence and the nervous symptoms predominate, or peroxide of hydrogen when the purulent features are most prominent as is the case especially in the rhinites of children. Thymol is also a most useful agent in certain cases where the discharges are liable to become inspissated. We have almost done away with aqueous sprays in the treatment of nasal diseases because of the mechanical irritation caused by the extreme force with which they strike the parts to be treated, using instead one or the other of the petroleum vehicles.

There has lately been brought before the profession by the chemists, McKesson & Robbins, a preparation of stearic acid and zinc which to my thinking bids fair to become a valuable addition to our armamentarium. In the manufacture of this new excipient stearic acid, prepared from suet, is used. When a soluble salt of zinc is added to this acid a light mollescent precipitate results resembling in its extreme lightness calcinated magnesia. Various medicinal agents are combined with this powder, such as tanic, boric, salicylic acids, balsam peru, aristol, ichthyol, menthol, and many others. One of the chief advantages of this preparation is its power of adhering to the surface upon which it is placed. Rubbed on the palm of the hand it is absolutely unaffected by the addition of water—the latter acting as quicksilver does, and when poured off not the slightest moisture remains. It is said to remain in place on the urethral mucous membrane for from six to twenty-four hours regardless of the passing secretions. Another important feature is its freedom from the formation of the little balls which has rendered the use of insufflations in the past more harmful than beneficial. Further experience with these preparations must be had before a conclusive opinion may be stated but at present we are most favorably impressed. In the pharyngitis which so often accompanies chronic rhinitis, where the mucous membrane is coated over with a tenaceous, glary layer of partially inspissated mucus, we first cleanse the parts by wiping with a cotton pledget until the secretion is entirely removed; then a five to ten per cent. solution of nitrate of silver is applied by means of a spray. The conditions which were first designated by Schmidt of Frankfort-on-Main, "bilateral pharyngitis," and which is so frequent in singers, is, in our experience, best treated by cauterizing the red granular streaks which stretch up along the lateral pharyngeal walls with mitigated lapis over their entire extent even up into the Rosenmuller's groove if need be. The results of this procedure, especially in vocalists, are often remarkable. The voice is improved and the disagreeable tickling sensation immediately removed. In catarrh of the crypts of Liuschka's tonsil the following operation is performed. After thorough cocainization of the palate, pillars, pharynx, and post nasal space, the palate is hooked back by means of a palatal retractor. I am accustomed to the one figured below and which is quite practical. After this the tongue is depressed by a large, short handled mirror and held so that the crypts of the tonsils can be seen in the mirror at the same time that the tongue is being depressed. A probe bent at a proper curvature, and having mitigated lapis fused in its head is then carried up into the crypts of the tonsils which are thoroughly cauterized. In this way much of the dropping of mucus so frequently complained of may be immediately arrested, and which may evade all other modes of treatment.

In hypertrophic rhinitis there is no time lost in any method of treatment other than the cold or electric snare, or the electric cautery. The results of this treatment are so much more satisfactory and permanent than those obtained by the use of chromic acid, acetic acid, etc., that the two methods in our opinion are not to be compared.

In circumscribed anterior hypertrophies the cold or electric snare is used. In the electric snare ordinary piano wire No. 8 is employed instead of platinum. The piano wire has greater mechanical and less electrical resistance and the former point is one of great

practical value in snaring post nasal hypertrophies. When a turbinated body is hypertrophic along its entire length we draw three lines of cauterization from behind forward with the knife shaped point, one above, one below, and one in the middle. I find that the results are much enhanced if the furrows thus burned are then carefully rubbed over with a crystal of trichloretic acid. The reaction after such an application instead of being more severe, is less, and the relief of obstruction thus obtained instead of lasting for only a year or a year and a half as is often the case when the cautery alone is used, is nearly always permanent.

Atrophic Rhinitis.—It has been my fate, it seems to me, to have to deal with more than my share of this disease. It commenced while at work in Chiari's Clinic in Vienna, when he portioned out to me six cases to be treated by Braun's vibratory massage. Instead of trying to dodge such a fate I have yielded and given the subject a good deal of careful attention. I will be as terse as possible in my description of the treatment which I have found most beneficial. It is an open question in my mind as to whether or not the fears of the douche causing ear trouble is well founded or not. I am aware that we have strong authority for such fears and such ones as Roose, Mackenzie, etc., are not to be ignored. Still, and it may be that my experience has been peculiarly happy, there have come to me no untoward effects from this valuable therapeutic agent, with the one exception of a man who in my presence deliberately turned his head to one side while taking a douch. At least I have my patients who are suffering with fœtid rhinitis take a douch once or twice in a day, but only in this disease is it ever used. I have the directions plainly printed on a slip which the patient takes away with him.

First let me digress long enough to say that after thoroughly testing Braun's vibratory massage in the Vienna Clinics I gave the results in a paper which I read last year before this Section. One of my conclusions therein was that to the cleanlinesss which is so essentially a part of this mode of treatment is due most of the speedy relief of disagreeable symptoms, fœtid secretions, etc. Braun claimed that under his method the atrophic turbinated bodies returned to the natural proportions. My experience has not substantiated this latter statement. During the past year I have modified Braun's methods in the following manner: The patient comes to me daily. A piece of absorbent cotton loosely pulled from the roll is torn to a size which will completely but loosely fit the inferior meatus and space included between the middle of the inferior turbinated body and septum. This *dry* cotton is held in the accompanying instrument, and the vibratory movements carried over the inferior, middle and superior turbinated bodies, pharynx (as far as possible), septum and floor of the nose. From three to six pledgets of cotton may be necessary in each nostril to entirely bring away the discharge, scabs, etc. Allow me to accent the fact that the cotton is dry, as I believe this dry method distinctly superior in its results to the moist method as recommended by Braun. This absolute cleanliness cannot be too strongly insisted on. On examination after this massage the mucous membrane looks pink and clean, and the patient often expresses a feeling of comfortable warmth and relief. Immediately afterwards we may use balsam peru, 10 per cent., iodo-glycerine, thymol in albolene, or any of the many good things recommended for the disease provided they are not too irritating. But I am convinced that the vibratory massage carried forth as above described has a distinct worth, and will shorten the treatment of fœtid rhinitis by many months.

I had intended to speak further on the treatment of simple laryngeal inflammation, especially as it occurs in singers, but I fear that I have had more than my share of time.

I have intentionally refrained from speaking of deflective septum in connection with rhinitis, as it would lead me into too vast a field,

In conclusion I would say that there are few cases that do not require constitutional treatment,

Rheumatism or the rheumatic diathesis, plethora, scrofula and alcoholism should be carefully watched for and treated according to the well known lines. We cannot cry out too loudly against smoking as a cause in many individuals of disease of the upper air tracts. Especially harmful are cigarettes, because the smoke from them is inhaled and this causes atrophy of the vocal cords. A recent case of this kind vividly brought the effect of cigarette smoke to my notice. An actor after two years of excessive cigarette smoking applied to me for an increasing loss of vocal resonance and timbre with recurring attacks of hoarseness. I found the vocal cords atrophied to two thirds their former size. I had examined them when they were normal.

MENTAL ABERRATION ATTENDING HYPERTROPHIC RHINITIS, WITH SUB-ACUTE OTITIS MEDIA.

Read in the Section of Laryngology and Otology, at the Forty-third annual meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY J. G. CARPENTER, M.D.,

OF STANFORD, KY.

President Central Kentucky Medical Society; Member of the Kentucky State Medical Society; Fellow and Organizer of the American Rhinological Association; Member Mississippi Valley Medical Society; Permanent Member American Medical Association.

Mental aberration attending intra-nasal affections and their sequelæ is considered rare by the profession; yet, it has been the experience and observation of many of the Fellows of the American Rhinological Association, that mental aberration, or insanity *per se*, has appeared upon the existing intra nasal disease, that removal of the latter often causes the former to subside.

Roosa gives, in his valuable books on "Diseases of Ear," a case of insanity and suicide, on account of tinnitus aurium. Experienced rhinologists can recall one or more cases of mental aberration due to intra-nasal disease. In fact, so much importance is attached to disease of the upper air passages, being the *fons et origo*, of mental aberration, that a committee was appointed, consisting of Fellows of the American Rhinological Association to examine inmates of State Insane Asylums, and ascertain the per cent. of patients affected with disease of upper air passages.

While consent has been given by the Superintendents to make the rhino-pharyngoscopic examinations, the committee has not yet reported, owing to the difficulty in getting the insane to submit to the necessary investigation.

It has been the common experience of practical

and experienced rhinologists to almost daily have patients with impaired intellectuality, the mind going into vacuity, the lawyer or speaker losing the thread of argument, the accountant making egregious blunders in his addition, another unable to concentrate his mind to read an interesting chapter or column or carry on a spirited conversation; another will hear an interesting discourse or enjoy a thrilling article, yet unable to give the salient points presented, is neglectful, absent-minded. A prominent farmer, in settling with his tenants, made numerous blunders, making mistakes in dollars and cents, as often against as for self. Is sad and despondent, very melancholic thinks he is losing his mind. A prominent merchant often fails to charge merchandise sold, or recharges the second or third time, or fails to enter the credits, is not dishonest and suffers much mortification on finding the stupendous errors, is irritable, easily insulted, has presentiment of sudden death, feels that he is losing his mind, is quite emotional. A young lady of good social position thinks herself unclean, unfit to keep company with her mother, sisters, sees numerous imaginary unclean spots on her dress and clothing, is morose, seeks solitude, is melancholic, says she will be lost on account of her sins, is often found walking the porch or kitchen in night clothes in midwinter, or wandering in this nude state out in the yard; she had been formerly quite anæmic, had retroversion and catarrhal endometritis, and with proper treatment, the latter was cured, but the mental aberration continued and was cured by treatment directed to the naso-pharynx and galvaniztion. Another patient, married lady, with chronic rhinitis, becomes intensely sick, excited, emotional, and has fear of impending death; sheds tears freely on going to church or to any public gathering; is despondent and seeks solitude. Treatment directed to the upper air passage and galvanism effect a cure. Another patient, a maiden, has been afflicted with symptoms enumerated in the last case, is afraid to be left alone, sleep by herself, or sleep in a dark room; at night, keeps the lamp burning brightly, the window shutters open, the window blind up so that she may see any burglars who might chance to disturb her quietude; she has insomnia, has the most intense aversion to her family, afraid of her uncles and aunts, seeks solitude; will not be seen by friends or strangers, has constant presentiment of death and other evil omen; only through force, will she leave her house; has violent headaches, highly emotional, brings forth tears in abundance, is suspicious of mother and sister, has many delusions. Treatment directed to upper air passages, nerve tonics, galvanism and proper attention to retroversion effected a cure.

Mrs. —, age, 35 years, former health good, family history excellent, has had hypertrophic rhinitis for years, nasal occlusion, though a woman of strong mind and body, is quite emotional, subjected to any great excitement or bad news, develops the tetanoid state; is given to frequent shedding of tears, seeks solitude, is melancholic; is restored to health by cauterizing the turbinated bodies (lower and middle). In twenty-four hours amelioration of her mental condition is perceptible to her family and friends: restoration to health is quickly accomplished.

Mr. T., age 25 years, has naso-pharyngeal catarrh and aural catarrh, with tinnitus aurium and deafness, acquired irritability of temper, melancholia; partial loss of memory, inability to think any length of time on one subject; has either frontal or occipital headache all the time; has insomnia, agoraphobia and anæsthesia of the skin in spots; has ocular catarrh and asthenopia and neuralgia in different parts of the body. Tuning fork heard best in left ear; drumheads slightly opaque and without polish. Hearing S. A., six inches; D. A., eighteen inches. This is a case of extreme neuræsthesia. Patient has been, on account of the above conditions, tempted to commit suicide, and will not remain alone night or day; "says he will kill himself if left alone, and can't help it," is deluded.

Mrs. M. D., age 40 years, has been affected with intra-nasal disease about 15 years; the time dates to an attack of acute rhinitis during the influenza, 1872. There was extensive hypertrophy of the lower and middle turbinated process, marked nasal stenosis causing pressure. Symptoms—headache, both occipital and frontal; patient seeks solitude, is melancholic, wants to stay at home all the time; though she has a lovely home and earthly blessings, her sadness and despondency last; sheds tears without provocation, is not, in feeling and disposition, her former self. Cauterizing the turbinated bodies and other local treatment, with a blood and nerve tonic, effect a cure.

Mr. H., age about 40 years; farmer, family history good, general health excellent, excepting the affection in upper air passages. Though he has been a hard worker and able to transact business, his health, for the last year or two, has been greatly impaired; he feels languid, indifferent, tired, that he is losing interest in business, has nasal stenosis, is a mouth breather, has an oppressed, full sensation in the naso-orbital regions; constant headache, greatly aggravated by colds, sudden changes in weather and hot sun; dislikes to be in company, seeks solitude, is melancholic, irritable, peevish, morose; has an indifferent, stolid, and insane expression; has constant pains in various regions of the body, at times increased in severity.

In the spring of 1891, his symptoms for worse were increasing; he sought no professional advice, but tried to work or wear off his indisposition; he went to the field to plow, had a violent headache, stopped plowing for a while and lay down on the ground; from this time has no recollection of what transpired for days. He failed to come home, left horse in the plow. Family and neighbors institute a search, but Mr.— could not be found. A nephew was in the city of Lexington and saw Mr. —— on the street in his shirt sleeves and old working clothes. Mr. —— could give no account of himself, did not know where he was, how or when he came to that city, nor on what business; said he "had a bad headache and lay down in the field," aud was aimlessly wandering over the city, speaking to no one, and like the "Wandering Jew," finding no rest but continually passing on, virtually was lost to himself and family and friends and surroundings. His nephew brought him home; he does not sleep well, appetite capricious; is very weak and nervous, says his "head (forehead) and left half of head hurt terrible bad, that the left half of head throbs all the time." A rhinoscopic examination reveals a naso-pharyngitis, hypertrophy of the lower and middle turbinated bodies, nasal stenosis; the post nares and vault of pharynx is a purplish red, and swollen, angry appearance, coated with thick, tenacious inspissated mucus; great tumefaction; the left side of the head is sensitive to touch; the tragus and mastoid and auditory canal show great pain and anguish on touch, the drumhead is bulging and greatly congested; paracentesis is resorted to; the throbbing pain, abnormal sensations rapidly subside. The naso-pharyngeal chambers are sprayed and cleansed with a mild antiseptic wash and daily medicated for a week with mild, soothing astringent non-irritant remedies, the congestion and inflammation reduced to a minimum. Now the turbinates are cocained and cauterized, and the nasal stenosis relieved in 72 hours. From the latter treatment, the mental faculties begin to clear up; the clouds gradually pass away; patient is sprayed for three weeks with mild astringent, anti- and aseptic, soothing remedies and in a month is cured of all mental aberration. The nasal stenosis and enlarged turbinates have been removed and the lining of the naso-pharyngeal chambers placed in a healthy state; patient is restored to former health and has no appearance in manner, expression or acts to what he was before the treatment.

Formerly, it was difficult to get the general profession to attach much importance to diseases of the upper air passages. They consider them local, and not capable of producing constitutional manifestations, and will tell a patient his intra-nasal disease does not amount to much, it will never kill him; to take outdoor exercise, eat nutritious food, and sleep

eight hours out of every twenty-four, and then laugh at patients for having acquired great irritability, melancholia, or tinnitus aurium from having rhino-pharyngitis, and will jocularly remark: You are hysterical, or are malingering. What absurdity! How irrational are these remarks to an intelligent and honest sufferer, whose only desire and prayer are relief and cure. I know no more troublesome affection than naso-pharyngeal and aural disease to the patient. Intra-nasal affection was, a few years ago, considered incurable; but now the light has dawned, and cure after cure is being made, though it will take the profession at large many years yet to realize what is the pathology, etiology, differential diagnosis, prophylaxis, the best therapeutic measures, and the sequels of intra-nasal diseases.

The symptoms characteristic of hypertrophic catarrh are, more or less impairment of the faculties of the will, intellect, emotion, and memory, irritability, anger, nasal obstruction, impaired nasal respiration, oral respiration, and hawking from the posterior nares of the characteristic yellow, ropy muco-pus. When the recumbent posture is resumed, there is a dropping or gravitation of the secretion to the posterior pharyngeal wall, which often causes irritative cough; at morning, when the patient arises, there is a great commotion of the respiratory muscles, produced in trying to rid the naso-pharynx of the abundant tenacious secretion, and nausea and vomiting are often the results. Other results are headache, either frontal, vertical, or occipital, impairment of one or more of the senses of smell, sight, taste, or hearing, hæmoptysis, and epistaxis, impaired articulation, tickling in the throat, constant inclination to swallow, paroxysms of sneezing, insomnia, frightful dreams, suicidal tendency, and inclination to suspect and doubt the sincerity of the truest friendship. The catarrhal inflammation may extend to the larynx and trachea, and give rise to the symptoms of laryngitis and tracheitis. Many catarrhal patients regard the thick, white, yellowish inspissations of muco-pus which are hawked from the naso-pharynx as tubercles expectorated from the lungs, and if a slight hæmorrhage of the throat occurs from the irritative cough and violent rasping of the throat, they think they are the subjects of prodromal phthisis. Even in epistaxis, if the blood gravitates and trickles from the vault and posterior nares into the pharynx, producing cough and irritation of the throat, and is ejected by the mouth, it is supposed to have come from below the glottis, when, if a minute physical examination of the chest, and a rhinoscopic and laryngoscopic examination were made, the site of the hæmorrhage would be located in the vault or posterior nares, and all mental and nervous shock, which are often more prejudicial and enervating than the occurrence of a true pulmonary hæmorrhage, would be avoided. Many victims of catarrh have a vacuous and depressed expression, and are gloomy, absent-minded, easily harassed, so that life seems a burden to them. Cold hands and feet, impaired circulation, numbness, anæsthesia, or hyperæsthesia of one or more parts of the body, peripheral neuralgia, palpitation of the heart, and anorexia, are frequently present in catarrh of the upper air passages.

COMPLICATIONS AND SEQUELS OF CHRONIC CATARRH.

It is very easy to account for the diverse affections following catarrhal inflammation of the upper air passages when the anatomical, pathological, and neurological relations of the parts are considered. The meninges and base of the brain are in close proximity to the catarrhal mucous membrane, and many blood vessels that the latter supply, also supply the former, either directly or indirectly. The same is true in regard to the distribution of the cranial nerves. They communicate with various ganglia and proximate and remote organs, and convey irritation directly or reflexly to different parts of the body. With what facility, then, when irritation or pain is produced in the terminal filaments of the nerves supplying the mucous membrane of the upper air passages, can it be transmitted to distant organs or members or brain! It is equally as easy to have irritation or congestion of the brain follow chronic catarrhal inflammation of the upper air passages. In the nasal cavities are the special nerves of smell, the olfactory nerves connecting the olfactory ganglia with the central parts of the brain, and communicating with the nasal branch of the ophthalmic, the anterior dental branch of the superior maxillary, the spheno-palatine, and the naso-palatine ganglia.

The gustatory, one of the special nerves of taste, is distributed to the tongue, and communicates with the submaxillary ganglion and hypoglossal nerve. The chorda tympani is a nerve of taste, a branch of the facial, and supplies the *mucous membrane* of the *drum*, also communicating with the gustatory. The glosso-pharyngeal arises from the medulla oblongata, and is distributed to the mucous membrane of the base of the tongue, pillars of the *fauces*, *tonsils*, *soft palate*, *middle ear*, *Eustachian tubes*, *drums*, and *upper part of pharynx*. It is a nerve of taste, sensation, and motion. The spheno-palatine ganglion supplies the *tonsils*, *soft palate*, *uvula*, *pharynx*, and *Eustachian tubes*.

The pneumogastric nerve, communicating with other important nerves, as the spinal accessory and the glosso-pharygeal, and with important organs (four vital ones—the heart, lungs, stomach and liver) supply the mucous membranes of these organs and that of the respiratory trail. They also supply the mucous membrane and muscular coat of the œsophagus, and send the superior laryngeal nerves to the mucous membrane of the larynx and crico-thyroid muscle. The inferior laryngeal nerve is a motor nerve, and supplies all the muscles except the crico-thyroid.

The spinal accessory nerve is a motor nerve, arising from the medulla oblongata and spinal cord, but receives sensitive filaments from the pneumogastric. It has external and internal branches, unites with the inferior laryngeal and recurrent branches of the pneumogastric, supplies the cleido-mastoid and trapezius muscles, and gets sensitive branches from the first, second, and third cervical nerves. The internal branches are directly connected with the vocal movement of the larynx; the external with respiration. The hypoglossal arises from the *medulla oblongata*, and is a motor nerve of the tongue, but receives sensitive filaments from other nerves after it leaves the brain.

The facial nerve, arising from the *medulla oblongata*, is a motor nerve to the muscles of the face, to those of the *external* ear and, by its *tympanic* branches, to the *stapedius* and laxator *tympani*, through the otic *ganglion*, the *tensor tympani*, through and by

connection of its trunk with the *vidian* by the petrosal, the *levator palati*, the *azygos uvulæ* and a few muscles of the neck, and receives sensitive filaments from the fifth.

The fifth nerve, the great cranial nerve of sensation, is divided into three branches. First is the ophthalmic, which supplies the lachrymal gland sac, conjunctiva and ophthalmic ganglion of the sympathetic and *nasal branch* to *Schneiderian membrane*.

The second division, the superior maxillary, supplies the teeth of the upper jaw and *mucous membrane* of the *antrum maxillare*, and the third division, the inferior maxillary, supplies the external ear and meatus, filaments to anterior two-thirds of tongue, lining of cheek, fauces and lower jaw, integument of chin, lower lip, and lower half of face and muscles of mastication. It is both a sensitive and a motor nerve.

Through the medulla oblongata and spinal cord, irritation of the mucous membrane of the upper air passages is conveyed to the brain, to the arm, forearm and hand by the brachial plexus, to the chest and its contents by the dorsal and sympathetic nerves, to the abdomen and its contents by the lumbar and sympathetic, and to the lower limbs by branches given off from the lower portion of the spinal cord and the sympathetic.

Neuralgia, partial paresis, hyperæsthesia, analgesia of the extremities, epilepsy, chorea, and accompanying chronic naso-pharyngeal catarrh, are readily explained through reflex irritation, and subside when proper treatment is given the catarrh.

The sequels of naso-pharyngeal catarrh are reflex cough, sneezing, stenosis of nasal cavities, ocular catarrh, asthenopia, aural catarrh, headache—either frontal, vertical or occipital—nasal polypi, tonsillitis, enlarged tonsils, hypertrophy of the submaxillary, anterior and posterior cervical glands, patulency of Eustachian tubes, hæmorrhage from the throat—either the naso-pharynx, larynx or trachea—epistaxis, laryngitis, tracheitis, bronchitis, and catarrhal phthisis, neuralgia, or numbness of the limbs or trunk, anæsthesia or hyperæsthesia of the skin, paresis of arm and forearm, dyspepsia, hay fever, irritability, melancholia, partial loss of memory or intellectual faculty, insomnia, frightful dreams, agoraphobia, vertigo, palpitation of the heart, neurasthenia, stammering, suicidal tendency, asthma, chorea, epilepsy, loss of taste, anosmia, anæmia, anorexia, deafness, reflex irritation of the genito-urinary organs, an abundant discharge of nasal mucus or sneezing during coitus, aphonia, erythema and herpes of the nasal integument and lining, tinnitus aurium, otalgia, dysphagia and constipation. In cases of naso-pharyngeal catarrh of long standing there is a tendency to irritation, catarrhal inflammation or debility of all the mucous membranes of the body.

When we consider the pathological elements of the various forms of chronic catarrh, and engrafted upon them, the very frequent or recurrent subacute naso-pharyngitis, with increased dilatation of the blood-vessels, hyperæmia, redness, heat, tumefaction and pain, followed by exudation of liquor sanguinis, diapodesis of the leucocytes, increased infiltration of the connective tissue, cell proliferation and disorganization of lymph; rhinoscopic examination showing a congested, red, dry and swollen appearance of the mucous lining—later on the dryness gives way to moisture and an abundant secretion of mucus or muco-pus, the mucous and submucous tissue is œdematous, infiltrated and thickened, and the glands and follicles are distended and abnormally active; and often added to this, the pressure of a polypus, septal spur, ridge, an exostosis enchondroma, deflected septum and adenoid growth in the vault and fauces causing irritation and pressure symptoms, congestion, and producing irritation and inflammation by continuity, contiguity and reflex imitation in distant organs and nerves; it is very easy to explain why mental aberration should attend long continued disease of the upper air passages, as well as other sequelæ.

About, or less than, a decade ago, the rhinologist was considered to exist only in name—a myth, and not entitled to a foothold in the profession; but to-day, rhinology has become one of the chief cornerstones of the temple of medicine and surgery. It is built on physiological, histological and pathological rocks; upon these we, the rhinologists, have builded our church. The gates of doubt, charlatanism, ridicule and infidelity shall no longer prevail, and now, in this enlightened day, "*he who doubts is damned already.*" To the general practitioner we say: Give the stomach, liver, heart and alimentary canal and chest organs a rest, and come up higher and see the light turned on, not through a glass darkly, but see new realms, diseases and pathological lesions, for old things have passed away. Behold a new creation!

To the gynecologists and genito-urinary surgeons the rhinologists are ready to say, Through reflexes and neuroses we meet you, not only halfway, but all the way. The intra-nasal tissue is glandular, erectile, and has various nerves, blood and lymph channels ramifying it like the utero-genital organs, and on proper provocation, sends out reflex irritations and congestions to the spinal cord, brain and other remote organs.

To the alienists we say, Look into the naso-pharyngeal chambers, and often a cause for insanity can be found. To the oculist, aurist, dentist: You must bow in reverence to rhinology, for your work is very often *nil* unless you pay your respects to the rhinologist, for often he only can solve your difficulties, and cure your patients. The more frequently you consult him, the better it will be for humanity. To the surgeon we say: You are indispensable.

The successful rhinologist, like the ideal gynecologist, must, from necessity, be a skilful and conservative surgeon.

Rhinology is a haven in which many "mortals" find rest, ease, surcease of sorrow, health, peace, joy and long life.

INFECTIOUS PSEUDO-MEMBRANOUS FOLLICULOUS TONSILLITIS AND PHARYNGITIS.

Read in the Section of Laryngology and Otology, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY W. E. CASSELBERRY, M.D.,

OF CHICAGO.

Professor of Therapeutics and of Laryngology and Rhinology in the Medical School of the Northwestern University (Chicago Medical College); Laryngologist to Wesley Hospital.

Repeated confirmation of the discovery of the specific bacillus of true diphtheria has stimulated renewed clinical as well as bacteriological study of other pseudo-membranous inflammations of the tonsils, pharynx and nose, so that our literature of the

past few months has contained numerous accounts of "Tonsillitis Lacunaris," "Angina Follicularis," "Pharyngitis Fibrinosa," "Pharyngitis Phlegmonosa," "Rhinitis Membranosa," etc.; a group of diseases which cannot be said to be as yet sufficiently and accurately described, for in some respects they closely resemble diphtheria while in other features they differ widely from that disease.

The opinion of bacteriologists that in these affections diphtheria can only be excluded positively by the absence of the Klebs-Loeffler bacillus, as determined microscopically, is doubtless correct as applied to a few border-line cases, yet one should not permit this fact to engender neglect of macroscopic signs and clinical symptoms upon which a differential diagnosis may also be made, usually with greater promptness, and with reasonable certainty. We are, however, better able to do this now, since we know that in a bacteriological sense, at least concerning diphtheria, there *is* an exact line of demarkation to be drawn.

Concerning the various forms of follicular tonsillitis and pharyngitis, bacteriology has not yet taught us so much, but we expect to show, from a clinical standpoint, that at least two of these forms of tonsillitis, are as distinct from each other as they are, on the other hand, from true diphtheria.

The recital of an interesting case in point will make our meaning more explicit.

The patient—one of the most intelligent and popular physicians of Chicago, had been exposed to infection by attendance on a case of so-called scarlatina-diphtheria.

A distinct sense of malaise and hebetude with slight soreness of the throat preceded, for a day or two, a chill, which was followed by a temperature of 104° F. Our first examination was made the following morning: temperature 102° F., pulse 100, skin perspiring, face flushed, mental hebetude, and enlargement of the cervical lymphatic glands. The tonsils were only slightly swollen, but were deeply congested and exhibited a thin, whitish, pseudo-membranous punctated deposit which corresponded with the follicular openings. Behind each tonsil, and separated from it by the posterior pillar, the chain of muco-lymphoid glands which occupies the angles of the pharynx on each side and courses thence upward into the naso-pharynx, had developed into a mass larger than the tonsil itself, and was covered by a similar deposit. Two or three isolated muco-lymphoid glands on the posterior pharyngeal wall likewise presented whitish points. No membrane could be observed at any time on any portion of the pharynx other than as described on the purely glandular parts, but we wish especially to emphasize the aspect of this deposit. It was *not* in "cheesy" pellets which often protrude from the crypts through the follicular orifices and which are composed of fat, epithelial debris, inspissated mucus, etc. It was a veritable pseudo-membrane, thin, gray, translucent and firmly attached to the underlying mucosa. Its punctated appearance around the mouth of each follicle suggested that the larger part of the pseudo-membrane might lay *within* the glandular structure—that the crypts and follicles were likewise lined with it. Here and there two, three or four puncta, from close proximity, ran together forming somewhat larger spots, and an occasional layer of muco-pus if not cleaned away would lend an appearance of still greater extent and uniformity to the pseudo-plague. Nevertheless, as far as concerned the pharynx alone, the absolute limitation of the exudate to the muco-lymphoid glandular structures and its punctated appearance differentiated it from the customary picture of genuine diphtheria, the aspect being plainly that which can best be described under the name of septic or infectious tonsillitis and pharyngitis.

But within the nose the view was somewhat different. After shrinkage of the congested turbinate bodies by cocaine spray and dislodgement of an abundant, viscid secretion, one observed a distinctly pseudo-membranous deposit to cover the vestibule and extend within the right nostril as far as one could see, that is especially over the cartilaginous septum narium and anterior part of the inferior turbinate body. This membrane was *uniformly* distributed over all visible parts in the right naris, but otherwise here also it differed from the ideal diphtheritic deposit, even when observed in the nose, it being thinner and semi-translucent. It had more the aspect of deadened epithelial debris, but was evidently not merely such. The left nostril was less affected. The external nasal appendage was much swollen, painful and of decided erysipelatous hue, the redness, however, being confined, not extending above the bridge of the nose. A good post-rhinoscopic view was not obtainable.

In explanation of this nasal feature of the case time permits us only to state, that non-diphtheritic pseudo-membranous rhinitis is common, that a variety of intra-nasal inflammatory states are accompanied by fibrinous exudates in which the absence of the Klebs-Loeffler bacillus has been repeatedly determined. Other microörganisms usually of the streptococcos or the staphylococcus species are often found and it is probable that infection, either primary or secondary by these microbes may result under favorable conditions in the formation of a pseudo-membrane.

I have only to remind rhinologists of the frequency with which an exudate forms after electro-cauterization of the turbinate bodies, and that individuals differ widely in their susceptibility to this formation. In my own experience a pseudo-membranous exudate has followed cauterization much less frequently since I have exercised special care in operating to leave an unbroken eschar, thus serving to prevent secondary infection by microörganisms.

The eyes of our patient were also affected, the right eye very severely, but as stated by Dr. Boerne Bettman, who had charge of these organs, they manifested none other than evidences of severe conjunctivitis.

The patient was confined to the house for two weeks, and suffered from a sense of depression for about two weeks more, when complete recovery ensued without any signs of the diphtheritic sequalæ, paralysis or nephritis. The treatment does not fall within the scope of this paper.

A certain interest attaches to this case by reason of the conjunction of the pseudo-membranous rhinitis with the follicular tonsillitis and pharyngitis, but the pressing question with these two conjoined as with either separately concerns the diagnosis: Is it, or is it not diphtheria? We might regret the absence here of bacteriological investigation, yet such, in part at least, would have defeated the very object of this paper which is to present, in connection with recently acquired knowledge of the bacteriological relationships, such a study of the clinical features that a reasonably certain diagnosis can be made therefrom in the sick room; for I submit that it is there and at once that one needs to answer this question correctly, and that too, in the nature of things most times without the aid of the microscope.

And first, what has bacteriology already taught us as to the identity or non-identity of these processes? It is established that genuine diphtheria is occasioned by the Klebs-Loeffler bacillus. But other microörganisms are capable of exciting pseudo-membranous inflammation of various clinical types which Loeffler is cited as having grouped together under the generic term of pseudo-diphtheria, meaning of course that they are not diphtheritic at all. Clinically they differ from true diphtheria in some one or more particulars—in character of membrane, constitutional symptoms or sequelæ, but resemble it so

closely that until the advent of bacteriological support, we were often unable to state positively that these non-diphtheritic pseudo-membranous cases might not be diphtheria of a mild type. This was often true of follicuous tonsillitis and pharyngitis or "angina follicularis." Investigators have uniformly failed to find the Klebs-Loeffler bacillus in this disease, but have found a variety of other microbes.

Sendtner,[1] of Munich, studied four cases and found the streptococcus pyogenes and streptococcus erysipelatosus, and recalls in this connection the clinical relationship which has been observed between erysipelas and puerperal fever, and angina follicularis. Barnabei,[2] of Rome, observed twelve cases which he denominated "primary erysipelatous angina." They were characterized by redness and swelling of the tonsils and fauces, and from the crypts of the tonsils an exudate soon showed itself in the form of small white points. A microbe, indistinguishable from the streptococcus erysipelatosus, was present in all cases. Dubler (*Virchow's Archives*, Heft. 3, 1891) also reports two cases of infectious phlegmonous pharyngitis in which both in the pus and in the splenic blood a microbe indistinguishable from the streptococcus of erysipelas, was found.

Rendu,[3] reports two cases in which virulent pneumococci were found, in which the angina follicularis was contracted while sleeping among pneumonia patients.

Hajek,[4] of Vienna, describes four cases of non-diphtheritic "pharyngitis fibrinosa"[4] connected either with the staphylococcus pyogenes aureus or the streptococcus pyogenes, one of which cases supervened upon "tonsillitis lacunaris."

It scarcely suffices, however, to attribute these diseases exclusively to the organisms named, since with the exception, perhaps, of the streptococcus erysipelatosus, they are all found in the mouth in health,[5] but in at least some of the cases, it is stated that they were present in unusually large numbers, and that the cultures showed great virulence.

With our patient the infection was with reasonable certainty traceable to a case of "scarlatina-diphtheria," but from a bacteriological standpoint this disease is likewise a false diphtheria, occasioned by microbes other than the Klebs-Loeffler bacillus. Bourges,[6] of Paris, classifies the anginas of scarlet fever into: 1. Angina erythematosa; 2. Angina pseudo-membranacea, occurring early or late in the disease, circumscribed or diffuse, mild or severe; 3. Angina gangrenosa. He concludes from bacteriological investigation that the erythematous and nearly all the early pseudo-membranous forms as well as many of the late pseudo-membranous cases, are caused by secondary infection with the streptococcus pyogenes which happens usually through the tonsils. Huebner,[6] of Leipzig, Babes,[7] of Pest, and Seifert,[8] of Wurzburg, assert practically the same. This is not assuming, however, that in exceptional instances secondary infection by the Klebs-Loeffler bacillus might not occur and genuine diphtheria become associated with scarlatina, but the probabilities favor the position that the case by which our patient was infected, was an ordinary streptococcus pseudo-membranous angina.

We have designated our case as "infectious," by which is meant that some distinct species of parasitic organism, having gained access to the affected parts, has there multiplied and acted, both directly and by elaboration of chemical poisons, as the specific cause of the disease. The contagious nature of certain forms of tonsillitis has long been suspected and much evidence thereof has been published by individual observers,[9] yet the fact has not been generally credited, for the reason that the greater number of cases failed of any such signs, and when evidence of contagiousness was conclusively present the disease would be attributed to the diphtheritic infection or the subject be dismissed as a mere coincidence. We now know that the diphtheritic infection, *i. e.*, the Klebs-Loeffler bacillus, is not present in this disease, but that there are present in the form which we describe under the name of infectious pseudo-membranous tonsillitis, other microörganisms of kinds that establish for it a possible contagious character.

I am sure that clinically, one can distinguish at least, *two* types of acute folliculous tonsillitis and I propose to name them in contradistinction to each other: 1. Simple folliculous tonsilitis, and 2, infectious pseudo-membranous tonsillitis.

With the simple form there may or may not have been previous chronic hypertrophy or inflammation; it is conditioned, if not caused by "taking cold," *i.e.*, by refrigeration of some part of the body surface, which determines vascular engorgement of the tonsils exactly as in another individual it may occasion vascular engorgement of the nasal turbinated bodies. The tonsil swells, the follicular openings are obliterated and the pent up secretion acts as a further irritant. it becomes inspissated and mixed with epithelial débris; it is soon forced out to the surface of the gland in the form of "cheesy" pellets, which are altogether different from a pseudo-membrane. Finally, when the tonsils are free of this accumulated débris, or at times, earlier, if the globules are forcibly dislodged and removed, the tonsillitis rapidly subsides.

The *infectious pseudo-membranous form* we have just described at length in relating our case, and it will again be referred to in the summary.

Now, we note in current literature a disposition to attribute all cases of tonsillitis and pharyngitis to "infection," the truth of which we cannot deny, for pathogenic microörganisms, being everywhere and especially present in the mouth, might readily invade the tonsils at a time when their power of resistance is lessened by vascular engorgement and pent-up secretion, and may even play an important part in the formation of the "cheesy" globules. In simple folliculous tonsillitis, however, such infection would seem more like a secondary than a primary process, for in typical cases the inflammation subsides as soon as the tonsil can be freed of its accumulated inspissated secretion; but "infection," either primary or secondary, affords a ready explanation of cases which deviate from the typical, which are mixed, and in which

[1] Internationales Centralblatt fur Laryngologie, Rhinologie, etc. April, 1892. S 472.
[2] Internationales Centralblatt für Laryngologie, Rhinologie, Nov., 1891, S. 243.
[3] Loc. cit., April, 1892, S. 473, and Nov., 1891, S. 243.
[4] Internationales Centralblatt fur Laryngologie, Rhinologie, etc., April, 1892. S. 475.
[5] Dittrich-Prager Med. Wochenshrift., No. 38, 1890. Int. Centralblatt fur Laryngologie, etc., May, 1891, S. 558.
[6] Int. Centrl. fur Laryngol., June, 1891. S. 619.
[7] Loc. Cit., Nov., 1889, S. 247.
[8] Loc. Cit., June, 1891 S. 619.
[9] Dubousquet-Laborderié Bouchard Landowzy, Int. Centr. fur Laryngol., etc., Mai, 1892, S. 520.

both "cheesy" and true punctated pseudo-membranous exudate can be discerned.

In summarizing, we will state what are seemingly the logical conclusions of this study:

That we can distinguish at least two forms of acute follicular tonsillitis.

1. Simple follicular tonsillitis, which is characterized by congestion and swelling of the tonsils, with protrusion from the narrowed follicular openings of cheesy globules which may simulate a punctated pseudo-membranous exudate, but which is really not such; without evidence of primary parasitic infection as a cause, and therefore not contagious; capable, however, of being transposed into a conglomerate variety of tonsillitis by secondary infection with pathogenic microörganisms; usually not preceded by a distinct chill, and not accompanied by much fever or systemic depression.

2 Infectious pseudo-membranous tonsillitis, which is characterized by deep congestion, but often only by moderate swelling of the tonsils, and by a punctated exudate of pseudo-membrane, the spots of which are in size from 2 to 4 mm. in diameter, and are attached around the follicular openings, presenting the appearance as if the crypts were also lined by the same material; *unlike* the cheesy pellet the exudate is thin, translucent, and so intimately connected to the underlying mucosa that it cannot be detached without bleeding or without force; two or more puncta may join at their borders and form larger spots, but after cleansing away all muco-purulent matter this punctated conformation of even the larger pseudo-membranous areas may be readily discovered. In addition to the tonsils, any or all of the muco-lymphoid glands in the pharynx may be likewise affected, especially the chain of glands located just behind the tonsil and separated from it by the posterior pillar, but the pseudo-membranous exudate is limited absolutely to the glandular structures of the pharynx, although careful cleansing and critical inspection will be required to demonstrate this fact. The cause is infection by any one of several species of pathogenic microörganisms, *e.g.*, streptococcus erysipelatosus, staphylococcus pyogenes aureus, pneumococcus,, streptococcus pyogenes, etc., and it is not unlikely that with closer clinical study aided by bacteriological confirmation, we may be able in the future to further subdivide this form of tonsillitis into varieties in accordance with the particular species of microörganism which has acted as the cause. It is infectious or contagious and is known to become endemic. It is often ushered in by a chill, and accompanied by moderate or even high fever. It may be complicated by albuminuria, but is not followed by paralysis. The Klebs-Loeffler bacillus of true diphtheria is never found in this disease. That by attention to these details this form of tonsillitis and pharyngitis, with very few exceptions, may be readily distinguished clinically from true diphtheria, which is characterized not by a thin translucent, punctated exudate, but by thickish, opaque, diffuse plaques of pseudo-membrane which are not limited to the glandular structure, but which, when originating on the tonsil, rapidly embrace as well the pillars of the fauces, and extend to or involve at the same time the posterior pharyngeal wall and velum palati.

NOTE: Since the completion of this paper our attention has been called to an article by Dr. Adolph Baguinsky, in the *Berliner Klinische Wochenschrift* of February 29, 1892. He examined for bacilli 154 cases, being all that were admitted as diphtheria to the *Kaiser und Kaiserin Friedrich Krankenhaus* during a certain period. They all exhibited "the same naked-eye local changes, *i. e.*, a dirty gray-white to green pseudo-membrane on the mucosa or tonsils." He does not state whether or not cases were included which are ordinarily denominated tonsillitis, and characterized by a *punctated* pseudo-membrane limited to the glandular structures, but one would infer that such were not included among his cases. Of the 154 cases, Klebs–Loeffler bacilli were found in 118, and these were the severe cases. The others contained only cocci and ran a mild course.

Baguinsky concludes that there are two diseases called diptheria—exhibiting the typical diphtheritic deposit, which can only be distinguished from each other microscopically; a result which is interesting, but not especially pertinent to the subject of our paper, which is tonsillitis. Baguinsky mentions also two cases of "rhinitis fibrinosa" unaccompanied by serious systemic symptoms in which Klebs–Loeffler bacilli were found, and advises caution regarding a non-diphtheritic diagnosis in this disease. The two cases, however, indicate but little, for it is not contended otherwise than that diphtheria, either nasal or pharyngeal, can occur with but slight systemic disturbance.

Closing the discussion, Dr. Casselberry said: I prefaced my paper by stating that "the opinion of bacteriologists that in these affections diphtheria can only be excluded *positively* by the absence of the Klebs–Loeffler bacillus, as determined microscopically, is doubtless correct as applied to a few border line cases." But I have described at length the clinical aspects of these forms of tonsillitis, because I believe it both necessary and possible thus to make a correct diagnosis in the majority of cases. I have been unable to find any record of the presence of Klebs–Loeffler bacilli in cases of apparent tonsillitis in which the pseudo-membrane was of the character which I have described in connection with the infectious form of this disease, *i. e.*, punctated, thin, translucent, and limited to the tonsils and muco-lymphoid glands of the pharynx. The cases cited by Dr. Wright as recorded by Baguinsky and others were nasal cases, evidently nasal diphtheria in which, by reason of the absence of constitutional symptoms, the disease, without microscopic examination, would have been mistaken for non-diphtheritic "rhinitis fibrinosa." As intimated in the paper, it seems to me more difficult to exclude diphtheria in nasal than in pharyngeal cases, although it would seem preposterous to assume even a possible diphtheritic infection as a cause of the many pseudo-membranous deposits which occur after the use of the electro-cautery in the treatment of hypertrophy of the turbinate bodies.

AT the late meeting of the Virginia State Medical Society, Dr. Landon B. Edwards, the efficient secretary of the society and editor of the *Virginia Medical Monthly*, was unanimously elected an Honorary Fellow of that organization.

THE WARREN TRIENNIAL PRIZE of $500 has been awarded by the staff of the Massachusetts General Hospital to John Strahan, Belfast, Ireland. Subject "Ricketts."

THE EDISON PHONOGRAPH AND THE BETTINI MICRO-PHONOGRAPH.

THE PRINCIPLES UNDERLYING THEM AND THE FULFILMENT OF THEIR EXPECTATIONS.

Read in the Section of Laryngology and Otology, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY J. MOUNT BLEYER, M.D.,
OF NEW YORK CITY.
SURGEON TO THE NEW YORK NOSE AND THROAT INFIRMARY, EDITOR ELECTRICAL REVIEW, NEW YORK CITY.

Gentlemen: I intend to lead you into the mystery of mysteries, by the demonstrations I am about to make and explain to you, regarding the adoption of the Edison phonograph and the Bettini micro-phonograph as an aid to our and other sciences. It will be necessary for me to make some explanatory remarks in order that you more fully comprehend the real mechanism of these wonderful contrivances of the age, both from a physical and mechanical point. I will then follow up by illustrating to you clinical phonograms, and other records and will then take before you several such records so as to demonstrate the practicability of my investigations.

The value of these two machines cannot be overestimated at the present time of my experimentations, and here I wish to state, that even some of my crude methods of taking and reproducing records or phonograms are not as yet sufficiently developed to make them thoroughly practicable for many reasons, but suffice it to say, that those which will be demonstrated to you, at this period of my investigation must at once lead all thoughtful students to think of the further prospects of the growth and development in the mechanism as well as in the application of the phonograph and the micro-phonograph. The results nevertheless are at this date gratifying and from my practical illustrations to you, I wish each of you to judge for himself.

At the onset of my lecture, I must say: That as a means of quantitative analysis, in reference to sound, musical and other tones can be measured by the phonograph and the Bettini micro-phonograph as heat is measured by the thermometer and air pressure by the barometer. The aim of all sciences is to become more and more quantitative, because you can have no standard of measure. When, however, the standard of measure can be obtained the analysis is quantitative and scientific, and the use of these two machines in physiological researches is a thoroughly scientific matter.

It is found that each succeeding age has either given birth to new scientific facts, or has elaborated preëxisting ones.

The phonograph was suggested to Mr. Edison in the spring of 1877, while making some experiments with a machine for automatically recording and reproducing Morse characters. This apparatus indented the characters in paper, much the same as a Morse register, The reproduction was accomplished by this new invention, which was intended to receive telegraphic messages from one circuit and to transmit them upon another without the aid of a skilled operator, and also to facilitate business in a repeating office.

As a source of amusement and to test the rate of speed at which a Morse operator could receive or read, the reproducing machine was caused to run at a high velocity, and when the speed was increased to such an extent that the ear could not recognize the Morse characters, Mr. Edison noticed that the machine gave off a humming or musical sound, which varied according to the characters on the record, apparently talking in a language which was not understood.

It at once occurred to him that if instead of indentation representing Morse characters, he could obtain indentations made by vibrations representing articulate speech, the machine would reproduce the spoken words. It was but the work of an hour for such a genius to make a little alteration upon that machine. He substituted for the telegraph recording apparatus a diaphragm with an indenting needle, and, with thi s addition the machine was used as a test for the idea of a phonograph. This test proved the correctness of his inventive judgment.

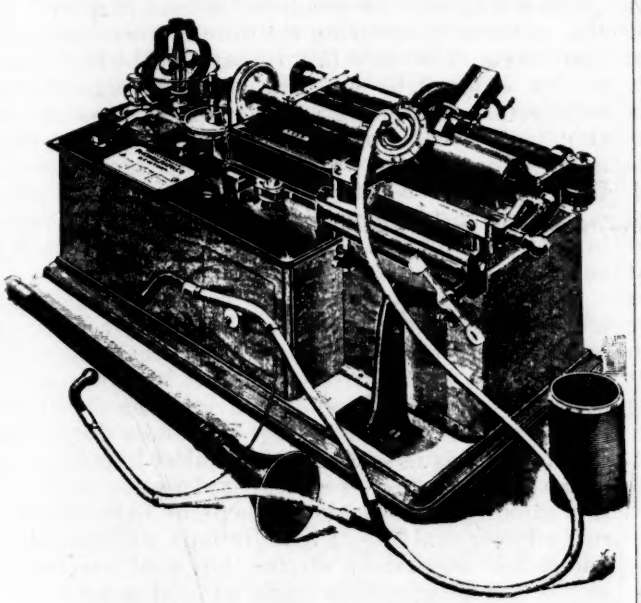
Following closely on the heels of this experiment, a phonograph was constructed on a plan more favorable for attaching a diaphragm, and tin foil for receiving the indentations was substituted for paper. It was then exhibited for the first time outside of Mr. Edison's laboratory at the office of the Scientific American and several different exhibits. One was then presented to the South Kensington Museum of London and the Academy of Sciences of Paris. It was a curious spectacle in witnessing the expression of the faces of the academicians when his agent, M. Puskas, caused the wonderful instrument to speak. A murmur of admiration was heard from all parts of the hall—a murmur succeeded by repeated applause. The learned Academy, generally so cold, has never before abandoned itself to such enthusiasm. Yet some members of a skeptical turn of mind, instead of examining the physical fact, ascribed it to moral causes, and a report soon ran through the room which seemed to accuse the Academy of having been mystified by a clever ventriloquist. Certainly the spirit of Ancient Gaul is still to be found among the French, even in the Academy. One said that the sounds emitted by the instrument were precisely those of a ventriloquist. Another asked if M. Puskas, face and lips as he turned the instrument did not resemble the grimaces of a ventriloquist. A third admitted that the phonograph might emit sounds, but believed it was much helped by the manipulator. Finally the Academy requested M. du Moncel to try the experiment, and as he was not accustomed to speak into the instrument it was unsuccessful, to the great joy of the incredulous. Some members of the Academy, however, desirous of ascertaining the real nature of the effects, begged M. Puskas to repeat the experiment before them again under such conditions as they laid down for him. M. Puskas complied with this request, and they were absolutely satisfied with the result. Yet others still remained incredulous, and it was necessary that they should make the experiments themselves before they accepted the fact that speech could be reproduced in so simple a way.

The anecdote I have just related cannot be interpreted to the discredit of the Académie des Sciences, since it is especially bound to preserve the true principles of science intact, and only to accept startling facts after a careful examination. Owing to this attitude, all which emanated from the Academy can be received with complete confidence; and we cannot approve too highly of reserve which does not give way to the first impulse of enthusiasm and admiration.

If this invention had taken place in the middle ages it would certainly have been applied to ghostly apparitions, and it would have been invaluable to miracle-mongers.

We have all read much about this wonderful invention and the world at large still awaits the further growth of that child.

The latest types of the phonograph and the Bettini micro-phonograph which forms the subject of this demonstration and paper are of the most improved patterns. Though the micro-phonograph has not had its exhibits as yet, with one exception, and that one was before the New York Medical Association, in April 1881, where I had the honor to first practically demonstrate this machine and show how as an assistant to medical and other sciences it might be applied.



The Edison Phonograph.

Here it would be well to give by way of explanation the principles underlying the phonograph in order that those of our profession not thoroughly versed in the scientific points of the phonograph and the micro-phonograph may grasp those details I propose to give. Note that when a stroke is given a bell, the blow sets the particles of metal in vibrations. These vibrations are communicated to the surrounding atmosphere, which being an elastic medium, conveys the impulses to the ear, and waves of sound pulses roll in very much as the waves come rolling in toward the shore down by the sea. The speed at which the sound travels is 1,093 feet per second at the temperature of freezing water,and as the temperature rises the speed increases about one foot to every degree.

Every human being has in his or her throat a delicate membrane which, when he or she speaks, is set in vibration, and in turn sends the vibratory impulses from the throat and mouth, and they impinge upon the drum of the ear. This membrane vibrates at different rates in different persons. For instance, in the soprano of womer. it is exceedingly rapid, while the bass of male singers is much slower. From this we find that the pitch of woman's voice is far higher, as a rule, than that of a man. The pitch of a tone depends upon the number of vibrations in a second, and upon nothing else, therefore if a tone is produced with double the number of vibrations of another, it is said to be an octave higher. Now, when we speak with the mouthpiece of the phonograph or the micro-phonograph transmitter, the sound pulses impinge upon the glass diaphragm of the phonograph and upon the metal diaphragm of the micro-phonograph, which causes the needle attached thereto (phonograph), and the spider attachment to the diaphragm of the micro-phonograph, to indent the composition wax cylinder as it traces over the surface, the depth, length and general character of the sound pulses. When the tone is loud and full, they are deep, and when the pitch of the tone is high the indentations are close together. The recorders are those parts of either of the machines that hold the diaphragms, and in the phonograph the recorder is turned to the right, bringing the reproducing needle thereon mounted into play, which, as it traverses the track made by the broader needle, slips in and out of the indentations therein, and in so doing moves the reproducing diaphragm on the phonograph with it, and thus by mechanically imitating the motions of the diaphragm in one's own throat, reproduces all that was spoken in loud, middle or low tones, sung in different registers, modulated tones as used by the actor or elocutionist, and in many other phases of reproduction too numerous to cite here.

The micro-phonograph thus far has been only alluded to. An illustration is given below in two cuts, representing one of the cardinal features of a new phonograph. This is the invention of Lieut. Gianni Bettini. It is of marvelous power and perfection, and stamps its inventor as a man of surpassing mechanical genius.

The Bettina Micro-Phonograph.

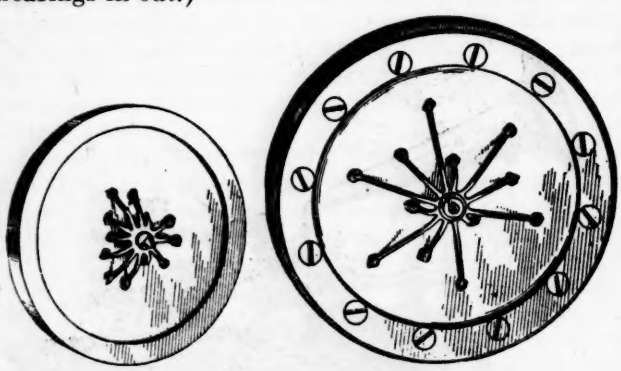
As an actual acoustical achievement in the recording and reproduction of both vocal and instrumental effects, it defies description in words. It can only be appreciated by listening to its performance.

This phonograph is peculiar in form and construction of its diaphragm and the novel and philosophical method of attaching to its surface the central needle-point, which also produces its indentations in the rotating cylinder of wax while the

diaphragm vibrates over it by the action of vocal words or instrumental sounds. Let me briefly explain this Bettini new diaphragm.

Instead of attaching the needle-point directly and firmly to the center of the diaphragm as heretofore done, Lieut. Bettini uses what he calls a "*spider*," which is a little frame having several radial legs, the feet of which bear against the diaphragm at a number of points surrounding the center, and at different distances from it.

The object of this "spider" with its radial bearings is to carry out the inventor's discovery that this tensioned diaphragm does not vibrate as a whole, as has been supposed, and as it would have to do under the action of air waves, according to the teaching of modern science; but on the contrary, that it vibrates in numerous small divisions or sectors which may happen to be in unisonant or tensioned sympathy with the vibrating organs of the voice or of other tones directed against the diaphragm. Thus should the center of the diaphragm, for example, happen to be a note or a silent point not in sympathy with a certain pitch of tone, some small sector might prove to be in exact sympathy, and would thus cause the needle, through one of the spider legs, to respond, and in this way not only would the whole diaphragm be utilized, making the reproduced tone many times louder than by a single point of central contact, but would secure much greater variety of the timbre, or *clang tuit* of voice, as also a record of a much greater number of voices and musical instruments than could possibly occur with a single point of contact with the diaphragm's center. (See these spider leg bearings in cut.)



Recorder Reproducer

Of Lieut. Bettini's Micro-Phonograph.

Although the Edison phonograph, with its single central bearing and needle-point, does actually record and reproduce accurately the spoken sounds and timbre of the voice, as also the sounds of a number of musical instruments played at the same time, it is a fact which you will observe at once, that its achievement in the complexity of articulate speech, in the inspiratory and respiratory sounds, either of the normal or abnormal, in the delicate fineness of any vocal expression, in the volume of tone and in the number of voices and instruments capable of being recorded at the same time, it is said by scientists that it bears not as good a comparison—due alone, as believed, to this method of utilizing the sympathetic sectors of the vibrating diaphragm.

Now if the inventor could actually determine beforehand every division and subdivision of the vibrating diaphragm constituting a sector which would act in sympathy with every pitch of tone employed in vocal speech and instrumental music, and could he then adjust a "spider" leg to each without unduly stiffening the diaphragm, the number of instruments and voices he could record and reproduce would be almost unlimited. Having no means, however, of thus determining in advance these various sympathetic sectors, he had simply to guess it, and attach his spider by as many points of bearing as he deemed prudent, the result of which has astonished himself no less than it has astonished all who thus far have heard the micro-phonograph. From the triumphs already attained by contact of the needle supports with only a few sectors of the diaphragm, there can be no doubt but many other sectors will yet be found and connected with the needle by additional "spider" legs, to bring the micro-phonograph to still greater perfection.

[1] Now with all the wonderful genius displayed by this inventor in utilizing the different sectors of the diaphragm, it is only fair to say that he has failed to give a scientific and philosophical explanation, satisfactory to himself, as to how it is possible for this single needle-point, in retracing this single line indentations in the wax cylinder, to reproduce all the marvelous acoustical effects of twenty or more voices and instruments in their complexity of pitch, intensity, quality, expression, etc. This he frankly admits he has been unable to do.

While the diaphragm, as we can now understand and as M. Bettini discovered, is originally acted upon and thus acts upon the needle by all the voices and instruments being directed against its different vibrational sectors corresponding in tension with the pitch, timbre, intensity, etc., of such individual tones, it is by no means such an easy matter to imagine or discover the true philosophical explanation as to how this same single, delicate needle point, in being again rubbed over this line of indentations, will reproduce loudly and accurately all the tones of a score of voices and instruments. And while it is no disparagement to the great inventor to say that he fails to solve this mystery of mysteries in acoustical science, it is but just to history here to place on record the fact that one writer alone of all contemporaneous scientific and philosophical investigators, has been able to accomplish this task. I here refer to Dr. Wilford Hall.

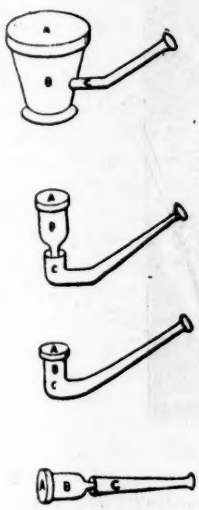
Mr. Robert Rogers, in speaking of the philosophical and scientific explanation of Dr. Hall's discovery regarding the phonograph, says: "Nearly two years ago, in the May number of *The Microcosm* (1880), under the head of 'Voice Pictures,' Dr. Hall printed a leading editorial by which he undertook a task he had contemplated for several years, of explaining the action of the phonograph, and also at the same time to account for the 'voice pictures' of Mr. Hughes, then creating a scientific sensation throughout the civilized world. It was this very problem of the hitherto inexplicable results of the needle-point reproducing spoken words by retracing its line of indentations in the wax cylinder, which Dr. Hall had the ingenuity to attack. And most remarkable to record, as an introduction to that unprecedented solution, he described in minute detail the very subdivisions of the phonograph-diaphragm into its small sympathetic sectors which must respond

[1] The Microcosm, Vol. ix, February, 1892, Dr. Wilford Hall's explanation of scientific forecast.

to the pitch, precisely as Lieut. Bettini was at that time mechanically working out!"

"A more remarkable case of determining intricate, mechanical and scientific results by pure philosophical ratiocination, which could only be known surely by experimental tests, does not probably exist in the records of physical research, not even excepting the discovery of Neptune by the great French astronomer, Le Venier. Indeed, the location and discovery of Neptune were based upon clearly observed movements of other planets, while there was neither a movement nor an indentation within sight under the most powerful microscope, to indicate to Dr. Hall the ground on which his magnificent physical discovery was based."

"In Vol. 7 of the *Microcosm*, under the title of 'Voice Pictures,' is found not only the foreshadowing of the true mechanical action of the phonograph-diaphragm in the subdivisions of its surface into small nodes and sympathetic sections as practically demonstrated by Lieut. Bettini, but there will be seen in detail the only possible explanation of the muliform and multifold work of a single needlepoint—an explanation which has defied all previous attempts, and which M. Bettini declares he had not been able to discover, even after his experimental demonstration of the same.



The Eidophone.

Tree Form.

In order to give my hearers and readers of this article an idea of this notable case of foreshadowing by scientific ratiocination alone, a philosophical result which could only be determined by experiment, I append here a few remarks from Dr. Hall's masterly editorial referred to:

"It has been a marvel to thoughtful acousticians how the phonograph diaphragm with its central needle point was capable, under the action of the human voice, of mechanically reproducing that voice even to the most minute articulation and inflection of the spoken words. It is known to almost everybody that such a diaphragm, if spoken to with its central steel point bearing against a foil or wax cylinder revolved under it, will produce a line of hollows and ridges as the cylinder rotates while the vocal words are being directed against the diaphragm. Then if the needle be replaced in this groove of indentations at the start and the cylinder rotated as before, the friction of the needle point rubbing against the indented wax or foil, will cause the diaphragm to repeat its original vibrations so as to reproduce the very same words that were spoken against it, even to the slightest modulations of articulate speech.

"It has been roughly assumed by physicists that the whole thing was explainable by the action of air waves sent off from the vocal organs, thus causing the diaphragm to vibrate, thereby to make the vocal impressions in the wax by the point of the needle.

Seaweed or Landscape Form.

"We confess that this was our superficial view from a first examination, as we originally gave it in the 'Problem of Human Life.' But we wish it now distinctly understood that we have since revised our conclusions and repudiated air waves as having anything to do with the effects of sound known as sympathetic action upon diaphragms, tensioned strings or anything else. Indeed, we deny that a sounding instrument sends off air waves at all, even for a single inch, as a mechanical cause of the vibration of a sympathetic diaphragm such as that of the phonograph, mechanical telephones, etc.

Pansy Form.

"Sound waves, however, or sound pulses are sent off or may radiate from a sounding body, and such sound waves are pulses, not of air but of the sound force itself, which is really as substantial and objective, though immaterial as is electricity which will

sliver a tree to splinters, or magnetism which will lift a piece of iron at a distance from a magnet.

"In the first place sound force is likewise assumed only to act sympathetically on a body in unison with its vibrational number; but while this is true it is also a fact that a tensioned diaphragm is really composed of many sections or subdivisions of tensional sympathy, each one of which is actuated by a tone of corresponding pitch or synchronism.

"This is proved by common experience in speaking to a tensioned diaphragm with light powder sprinkled over its surface, different varieties of pitch and peculiarities of tone distributing and arranging the powder differently according to the portions of the diaphragm most powerfully influenced by the given tone employed. And here is the sole explanation of the wonderful effects described in the beautirul achievements of Mrs. Hughes, Margaret Watts, which we have copied, by so pitching, directing and guaging the voice as to call into sympathetic action the minute tensional and unison portions of the diaphragm in such manner as to form the pictures of leaves, flowers, etc., by her peculiar distributions of the powder.

Serpent Form.

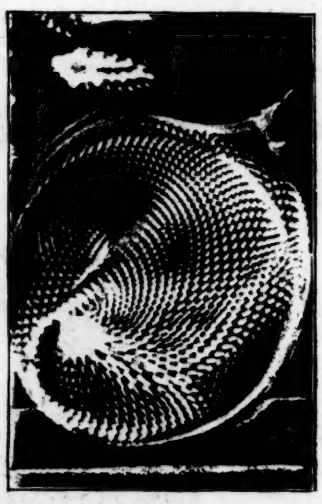
"Now it is manifest that no such sympathetic selection of tensional and unison portions of a diaphragm could be accomplished by mechanical waves of air, if such waves really exist, which dash bodily, like water waves, against the whole surface of the diaphragm whatever pitch of tone is employed, whereas, pulses of sound force can and will normally select such sections only of diaphragm as will sympathetically respond to their pitch, and thus will only move the entire diaphragm and its central needle-point incidentally by the more energetic movement of the sympathetic portion directly acted on by the sound.

"It is plain, if these analyses be correct, that such sectional vibrations of the diaphragm at all sides of the needle, according as the pitch and intensity of the tone should change, must give a slight wabbling or lateral movement to the needle point in its line of indentations as well as the appropriate varying degree of depth and distance apart of the individual impressions,

"Such a line of indentations composed of the requisite depths and alternate distances apart to correspond with the pitch and intensity of the producing sounds would also have for the needle point an almost infinitesimal lateral zigzag system of impressions, though too fine to be discovered under the microscope, by which the peculiar quality of the voice of the speaker and the articulation of words would be reproduced from the diaphragm when the needle should be caused to re-traverse the same line of indentations.

"By this forced lateral and zigzag tremor of the needle point the original sectional vibrations of the diaphragm that had actuated the needle would be reproduced, thus developing the same quality, pitch and intensity of the sound force originally liberated by a similar action of the vocal organs.

"That the needle point can and may actually produce the lateral zigzag indentations here claimed while producing the line longitudinal to the direction of the needle, and still too small to be perceived under the most powerful glass, as the real cause of the quality and articulation of speech, may rationally be inferred by the fact that the tuning-fork will liberate audible sound force when its motions are many thousand times too small to be detected under



Cross-Vibration Figure.

the most powerful microscope ever constructed. This was proved by our original discovery of a method for measuring the distance of a prong's travel even after sounding four minutes." (See the elaboration of that discovery by Capt. Carter, *Microcosm*, vol. iii, page 154.)

During several years of practical application which I have given to the study of applying these two machines above alluded to, in the several sciences as well as making them to serve as an aid to medical science, I came to some positive conclusions which bore their own fruits, and which at the beginning of my studies were fully anticipated.

As a special department of medicine which involves the throat, nose, and chest diseases, I owe much to the aid already received from the phonograph and micro-phonograph. Naturally enough my practice brought me in direct contact with celebrated people and artists of high vocal culture and rank and with their already fully trained voices I began to make some investigations regarding the adoption of a standard of singing, speaking etc., for myself to judge from, with those whose training was not up to

standard. Those excellent artists for instance whose records I have taken and possess, were those whose education in the art of singing accorded with various methods in vogue, such as are taught by the German, Italian and French schools, and certainly by repeating to oneself over and over again such phonograms one must become from many such comparisons a good critic in the art. It is astonishing to hear the differences in the methods that the special training of one of these schools gives to singers and also the ones to actors, elocutionists, etc., and more so again to compare those singers of a mixed school with those whose singing is simply naturally produced by their own efforts and training. What differences that wonderful tell-tale betrays! The music that is in the well trained artist rings forth its melody in its pure musical sound out of the indented pulse waves imprinted on the cylinders of the composition wax. Making these serve for comparative study with the lesser, natural and other voices, I have gained much profit in regard both to the different shades of tones and qualities possessed by their vocal organs.

It is known that with instruments made in exactly the same way, there is still perceptible, a certain difference in the shade, in the quality or the timbre of their tones. So we find it with the human voice. A certain standard is necessary in order to judge of the proper timbre-pitch and quality in a tenor, baritone and basso voice, as well as in a soprano, mezzo-soprano, alto and contralto. By bestowing some further experimental study on this subject, I am certain that shortly I will bring forward a standard as well as an additional new art to aid the learning of singing, speaking correctly the languages, elocution, acting and many other points connected with them.

Some of the records which served me for my purpose were taken from the celebrated tenors, baritones, bassos, and female voices of the New York Metropolitan Opera House, as Julius Perotti, Andreas Dippel, Carl Strietmann, Mr. Koppel, etc., Theodore Reichmann, Emile Steger, Conrad Belrens, Frl. Koschoska, Frl. Nicolini, Sig. Gorski, Mina Bertini, Helen Mora—famous contralto—Bertha Ricci, and many others less educated in singing and in the several arts. Amongst them for comparative study of elocution and acting were many celebraties from American, German, Italian and English stages.

As for the assistance derived from the phonograph and the micro-phonogrph in connection with the treatment of singers', actors', lawyers', clergymen's, etc., throats, noses and voices from a medical standpoint, they were of special use to me in phonograving their voices, when in what singers and actors call "good condition," and those were preserved for comparison in case any one of them should be taken with any ailment of the voice, thus making the normal record a standard to serve me to go by while under treatment and recovery. Also found them valuable in taking clinical phonograms for further study, as well as to demonstrate from. The following rule is one which I always adopt: To always take a record of any case that comes to me for medical relief, so that I may be able to judge of the progress of the gradual recovery of such a voice, etc., under treatment. There I have the extra aid to judge from, both the eye and the ear.

Recently I brought before the notice of the New York Medical Association by way of illustration, the project of taking and preserving records of specimen patients, which records would demonstrate a certain characteristic cough or signs,such for instance, as the whoop of whooping cough, asthmatic breathing in all its forms, stenosis of the larynx, due to whatever cause, and which is so evident in cases of cramp and diphtheria, also of the nostrils to any of their causes, the hoarseness of laryngitis, corditis, the rough breathing in tracheitis, nasal troubles, cries of babies at different periods of their growth. Stuttering, imperfect speech. To these latter two, much aid is gotten from the use of these machines as a tutor for correcting the difficulty. Sneezing, normal breathing as contrasted with the abnormal, etc. These cylinders or phonograms I have and propose to utilize as demonstrative evidence and illustration in the lecture rooms, to be added to the didactic and clinical methods of my teachings.

It is certain that students and men of our and other professions would gain more from one lecture in any branch of science, etc., thus aided by the phonograms, than from two dozen of the ordinary and prevailing ones. Cabinets may be arranged as libraries in which all kinds of records may be preserved either referring to or representing the different kinds of diseases of the throat, nose, chest, etc., and in their different stages. To such and other phonographic libraries many interesting features might be added. I am laying the first foundation to a phonogram library.

For many years I made use of the microphone, constructed on a special principle, for magnifying the sounds of the lungs, heart, throat and blood vessels, in their normal and abnormal states, and then recording them directly to the phonograph. Most interesting experiments have been its outcome. At the International Congress to be held at Rome in September, 1893, I propose to exhibit some medical micro-phonogram specimens.

Some experimental records were also made regarding the development of the natural or acoustic alphabet, but as yet I am not ready to submit a statement of any facts on account of the many difficulties still to be overcome.

Regarding the different methods of teaching which are in vogue in elocution, reading, reciting and acting, many very interesting and successful features were the outcome of these experiments and will prove valuable to those interested in those branches of study. Mr. Thomas A. Edison has interested himself in my behalf and regarding these studies, and has specially constructed for me a phonograph which has many new attachments besides some fine diaphragms on a new principle; with this aid I am now able to receive on its recorder the finest of tones and reproduce them. Hoping then to carry out further experimental researches which heretofore handicapped me by the want of proper mechanical appliances. But with such instruments as Mr. Edison has now placed in my hands, and the micro-phonograph, both which I possess as a gift from these inventors for my furthering the study already carried out, will beyond a doubt replace those appliances to any former ones in use.

With both these machines only success must follow my further research chiefly in the medical science.

Another great difficulty which has now been overcome by the Edison phonograph and Lieut. Bettini's

micro-phonograph is the old one—that is, not even sacrificing the perfection of articulate speech to volume of sound. These are the latest additions made to them. The Bettini as well as the Edison machines, have become valuable instruments for teaching on account of their accurate reproduction and loudness.

Amongst some of the latest uses of the phonograph and micro-phonograph is one suggested by the daughter of Rabbi Brown, of Cleveland, that the phonograph and the micro-phonograph may be used to teach the blind to read. This Mr. Edison intends to utilize, and now is working out a method by which to reduce the size of the cylinders and yet increase their capacity. The recording needle is being reduced to half the size of the present one. The screw is made smaller so as to increase the revolutions of the cylinder. The number of words can thus be increased, with some extra alteration, to from 4,000 to 5,000 words, and the durability of these cylinders will be such as to be able to repeat the records 3,000 times. Experiments are now going on at the Edison laboratory, so that duplicates of any records may be made to any number.

Dr. H. F. Garey, of Baltimore, adapted the phonograph to the cure of deafness. He speaks of his success as being simply phenomenal, and considering the simplicity of the principle now, since it has been discovered, he is surprised that this adaptation of the phonograph for the cure of deafness was not earlier brought to light by the great aurists, whose reflected brilliancy has been shining down upon us. But it is a repetition of the same old story, proven again and again, especially in science and matters of invention, and in all great discoveries.

The principle is that the sound emanating from either the phonograph or micro-phonograph produces a massage of those parts of the ear which transmit sound to the brain, by giving continuous and successive vibrations at regular intervals. This it does with certain degrees of intensity and frequency, according to the exigencies of the case. In bad cases, a series of intensified shocks at the rate of one to the second is produced against the drum. In cases of not over five years' standing, the vibrations are given with more frequency and less intensity. This I believe is the proper caper, and records can be made to suit all kinds of cases, regarding the proper intensity of the sounds to be administered, in the same way as an electric current is given to a patient. All such records may be graded accordingly.

With some of the latest improvements of the phonograph it has been brought very near the point of perfection. It is much more simple, it is automatic in adjustment, efficient in action and easy of manipulation. An author can dictate chapter after chapter upon the cylinder by means of the phonograph, and the typewriter can put these into printed form with little trouble; thus one of these cylinders may be made to take scores of chapters and reproduce them for the press.

The phonograph has come much into use as assistant in dispatching correspondence, and it is not used in lieu of, but in connection with the stenographer. It has also come to reproduce the orations of our celebrated speakers, the recitations of skilled elocutionists and the fine effects of dramatic and vocal art.

As mentioned in my former article on this subject, as a teacher of all languages it has no equal, since it repeats with marvelous accuracy every word spoken into it with correct pronunciation, and records the finest variations and shades of sound with absolute precision.

It is a human photograph, as spoken of in *The Phonogram*, "beginning to inscribe one's words from the cradle and following one to the grave." Also has come to bring back the voice of the departed we love.

The latest use made of the phonograph is to receive messages on the telephone.

These machines have so many uses that the time is near when they will be as generally adopted as the sewing machine. What I have here spoken of is not an illusion, nor a future possibility, but that which is done each day, and as the advantages of modern electrical facilities are more appreciated, these machines will become more and more recognized factors in facilitating labor and aiding sciences in many thousand ways. I must confess that much can still be improved in them—but we are on the eve of the discovery of the final secret of the true scientific phonographs.

I would like to add in addition to these remarks that the phonograph, with its wonderful resources, is not the only instrument that Mr. Edison has added to the physician's armamentarium. In the early stages of the phonograph, great difficulty was found in procuring a battery which had the requisites for running the instrument in a satisfactory manner, and Mr. Edison, after trying every known species of battery in the market, evolved the Edison-Lalande cell, which possesses those requisites in a remarkable degree: inasmuch that it now stands before the public as the only perfect battery of the day. It was found so efficient in its work on the phonograph that it was determined to place it on the market for general purposes, and it has now been in use for upwards of three years by all the leading railroads in the country for telegraph work. Having heard that the medical profession were experiencing great difficulty in procuring satisfactory apparatus with which to administer general electrical treatment and for use in general surgical work, where the use of the electric current is necessary, Mr. Edison finally determined to adapt the battery for this kind of work, and the Edison Manufacturing Company have placed on the market a complete line of physicians' batteries, which I believe will fill a long felt want. The great requisites in a battery for medical work are the following:

1. Constancy of current, so that a physician can administer treatment with confidence that his battery is delivering a known quantity of electricity; and when it is used for running cautery knives and lamps there is no danger of the lamp or knife being burnt out, and thereby causing great annoyance to the operator. The Edison-Lalande battery has a current which is absolutely constant during the whole life of the battery.

2. No local action or waste when the battery is not in use. The local action in the Edison-Lalande battery is practically nothing, so that the battery can be left without any attention whatever, and will always be ready for work until the elements are entirely exhausted.

3. Long life. The Edison-Lalande battery in its different forms as used for galvanic and cautery work, will last the average physician a year or more, without recharging.

4. Cleanliness. The Edison-Lalande battery has no odor, nor do any salts form on the top; so that it can be placed in any convenient part of the office without destroying carpets, or causing instruments to rust from the fumes which are usually found in the batteries in use to-day.

5. Low internal resistance. The Edison-Lalande battery has practically no internal resistance, so that every particle of energy is utilized on work, instead of being partly exhausted before it leaves the battery.

The Edison Manufacturing Company have put up their batteries in handsome cases, and the equipment of each instrument is first-class in every respect. They have an exhibition here, and will be pleased to furnish any information that may be needed.

My only hope is that the next communication I make to our profession will be more fully in detail, and more profitable; thereby placing in their hands an appliance as an appreciable precision instrument to be made use of in our science.

118 E. Sixteenth St., New York City.

GYNECOLOGICAL OBSERVATIONS IN THE INSANE.

BY C. A. KIRKLEY, M.D.,
OF TOLEDO, OHIO.

The observations recorded in this paper were made at the Toledo Hospital for Insane during a part of 1890 and 1891, the opportunity being kindly given by Dr. H. A. Tobey, Supt.

Owing to the vicissitudes of politics, Dr. Tobey was succeeded by Dr. C. E. Tupper who kindly permitted the work to go on. To these gentlemen and their assistants is due the credit of facilitating in every possible way the difficult work. Acknowledgement is due Dr. Faber, one of the assistant physicians who kept a clinical record of the cases reported. Investigation in each case has been difficult, and it has been impossible to obtain reliable histories in some of them. In some cases patients had regained their normal mental condition sufficiently to give something of a correct history, but that concerning the reproductive organs in the application for admission to the hospital has been of little value. Such indefinite causes as "womb trouble," "menstrual derangement," "change of life," "child birth," etc., are usually given. While these indefinite conditions may have been factors in the production of insanity in each case, the special gynecological disease existing prior to manifestations of mental disease could only be guessed at. Whatever may be of interest in this paper therefore relates to existing disease of the reproductive organs, and the effect of its relief upon the mental condition rather than to the part those diseases play in the production of insanity. The annual report for the fiscal year ending Nov. 15, 1890, shows that of 130 first admissions, in 35, or nearly 27 per cent., the cause was attributed to some disease concerning the reproductive system, and for the year ending Nov. 15, 1891, of 130 first admissions 42, or more than 32 per cent. From these reports it is evident that a large proportion of insane women have gynecological disease, but whether these diseases produce or complicate insanity is not so clear.

June 1, 1892, there were 595 women in the hospital. Abdominal section had not been performed on a single patient so far as known, and only one case had undergone a gynecological operation. The patient was a dipsomaniac, and was suffering from complete prolapsus uteri. She was the mother of one child born five years ago, and for three years prolapsus had existed due in part to relaxation of the pelvic floor.

Since the birth of her child she became a physician and began practice, the child in the meantime dying. Domestic troubles also culminated in divorce from her husband. She was subject to attacks of violent headache at or near her menstrual time, and would resort to morphia for its relief, large quantities of that drug being necessary to control it. The severe headache was attributed in part, at least, to reflex causes. Tait's "perennial extension" operation was done resulting in complete relief of the prolapsus. Within about three weeks after the operation she was attacked with acute mania, which was more or less violent, and which lasted for about three months, and ended in apparently complete recovery. Whether the insanity was due to the combined effects of disappointment in life, grief at the loss of her child, the more or less habitual use of morphine and stimulants, and the constant irritation of the nervous system from the prolapsus, or to the operation, is impossible to determine, but it is reasonable to conclude that the operation may have produced the explosion, the other factors having played an important part.

That insanity exercises a peculiar influence upon the sexual organs of women there can be no doubt. This may also be said of insanity in men. Mrs. Etta Kelley, a faithful and competent attendant at the hospital, ascertained that of 595 inmates, perverted sexual function was known to exist in 230—nearly 39 per cent. This number admitted to her that they practiced masturbation whenever the opportunity presented itself, which, however, is not often, as the cottage plan upon which the hospital is built makes suitable classification possible, so that a patient is rarely alone. A singular fact is that most of these patients were either married or widowed, and still more surprising is the advanced age of most of them. No reliable data could be obtained as to the present social condition of many of them, but the age was ascertained in most cases:

Twenty-one were between the ages of 14 and 30; 68 between 30 and 40; 82 between 40 and 50, and 19 between 50 and 60. Only two were 14, two were 21, three were 20, and one was 22. One was 67, two were 70, and the age could not be ascertained in the remaining 29. It will be seen that the greatest number (82) practiced this unnatural habit within and during the climacteric period, and that comparatively few were among the younger women. This contradicts the frequently repeated statement that unmarried women and young girls are so given to this vice. The comparison between sane and insane in this way may not be accurate, but in defense of the former it may be said that it does not prevail to that extent that is commonly supposed, and it is extremely doubtful if any pure-minded young girl has the slightest idea of sexual desire previous to her marriage. The truth of this proposition may be questioned, and it is admitted that it is not easily proven but it is based upon the fact that the sexual desire in women is latent as a rule, and that its actual existence, varying, of course in intensity in different women, is the result of development. Physicians are not unfre-

quently consulted both by young husbands and wives concerning the want of sexual desire on the part of the wife, who confesses that she has never experienced that desire as she is aware of its existence in others; that she is entirely passive, and submits to the approach of her husband only to gratify him. This uncultivated instinct in woman-kind fortifies her naturally stronger moral sense, the better qualifying her to fill her exalted position in life. A friend in discussing this subject, suggests that the young girl "does not encourage the desire, she is not tempted in any way to gratify it. It does not disturb or control her, but may she not feel it at times? The normal desire becomes abnormal under abnormal excitement and then she may reach the point of mental danger." That some girls may have experienced the desire before marriage, without having been excited may be true, but those instances are probably exceptional. The ungratified desire induces the habit of masturbation, and there is no reason to believe that the vice exists more frequently among sane than insane girls, and when it exists in the latter it is rather the result than the cause of the mental disorder.

It is a notable fact that religion as a cause of insanity goes hand in hand with sexual perversion, the reason, no doubt, existing in the emotional character of each. The foregoing statistics would suggest that whatever the cause may be that produces the mental disorder, it so disturbs, and perhaps stimulates those nerve centers that control the sexual desire, that masturbation is the result. Idleness and solitude, of course foster this vice.

The *Medical Record* of May 21, 1892, contains an interesting letter on the insane in Egypt, by Dr. H. F. Peterson, of New York, who informs us that nymphomania is very common among insane Egyptian women, and that clitoridectomy is performed on every Egyptian woman at an early age as a religious rite, which, however, does not seem to lessen the number among insane women with sexual element complications. Almost every patient has an excuse for the practice of this habit, which is only interesting as a curious delusion. One says that unless she does so she cannot urinate, another that certain women become men who outrage her, another that she was disappointed in love, etc. These patients have a strange propensity for putting foreign things into the vagina. On examination at one time a spool of thread, a stick, some paper, a piece of glass and a string were found. The patient was about 55 years old.

Many difficulties are encountered in ascertaining a correct clinical history, and the physical condition of the sexual organs in the insane. The record taken upon admission is the only reliance, as very few patients can give anything like a correct one of themselves, and one's own ingenuity must be relied upon for finding out the physical condition. Some patients actually refuse to be examined at all, others submit only under protest, and therefore constantly struggle, while in other cases in which the indications of uterine disease are quite evident an examination can only be made under anæsthesia. Reports have appeared from time to time concerning the effect of gynecological treatment upon the mental condition. Marvelous and in some instances magical effects have been reported. Within a year a case was reported in a Western medical journal, that had been insane for years. The attending physician removed the uterine appendages with a view of curing the insanity. Immediately upon recovery from the anæsthetic the mental equilibrium was restored, and had remained so ever since—a period of several months.

The results of treatment in the cases herein reported do not sustain the position that the normal mental condition is restored upon the disappearance of the gynecological disease. Seventy-five cases were treated during the period of observation, and the following are given as a type, with the result of treatment upon the mental condition in each case:

Case 1.—J. C., an Englishwoman, 44 years old, married but has never been pregnant. Has been insane four years, cause unknown. The cervix uteri was eroded and the cervical endometrium inflamed. The treatment was by curetting and the topical application of tinct. iodine and carbolic acid, as recommended by Dr. Skene, of Brooklyn. Due attention was of course given to the general health. The disease entirely disappeared and the general health greatly improved. Within a year after treatment it was ascertained that the mental condition had only slightly improved, though the patient was apparently well physically.

Case 2.—N. B. O., American, aged 25, unmarried, insane a year. The record gave heredity as the predisposing, and her mother's death as the exciting cause. The type of insanity was suicidal melancholia. She was treated for chronic endometritis, complicated by acute vaginitis probably of specific origin. The disease entirely disappeared within a few weeks, and her mental condition so much improved that she was discharged.

Case 3.—K. S., Irish, 26 years old, married, the mother of one child 18 months old. She had been insane four months, the attack coming on very soon after a miscarriage, being in very feeble health at the time and very anæmic. "General debility" was given as the predisposing cause. The form of insanity was acute melancholia. The uterus was enlarged from subinvolution, retroverted, and there was unilateral laceration of the cervix extending to the vaginal insertion. The laceration was repaired, potassium iodide given, hot water vaginal douches employed twice a day, and the displacement corrected as much as possible with a glycerine tamponade. The uterine disease was entirely relieved in due time, and her normal mental condition was completely regained. Nine months after leaving the hospital she was still in good health. The prompt recovery from insanity in this case can be directly attributed to the cure of the uterine disease.

Case 4.—A. F., American, aged 33, married, mother of three children, had been insane five years. Her record gave "child-bearing" and "anæmia" as the exciting causes, but the predisposing cause was not given. She had chronic endometritis and unilateral laceration of the cervix. The uterus was curetted and the laceration repaired. The operation accomplished all that could be desired as far as the uterine condition was concerned, and the general health somewhat improved, but a year afterward her mental condition remained unchanged.

Case 5.—M. S., German, aged 24, married, no children, had been insane a year. Syphilis was given as the cause of her insanity. She was suffering from an acute vaginitis, of probably specific origin, which had extended to the endometrium. A solution of silver nitrate, 30 grs. to the oz., was applied once a week to the inflamed surfaces, and hot water vaginal douches were employed night and morning. Constitutionally she was given ¼ gr. doses of the mercuric protoiodide. She completely recovered from the disease and her physical health very much improved. There was also slight mental improvement, which, however, was only temporary. This was probably a case of syphilitic insanity, a cerebral lesion no doubt existing. The pelvic disease, therefore, was purely incidental.

Case 6.—M. E. M., German, 45 years old, married, never pregnant, had been insane twelve years with chronic melancholia. The exciting cause given in her record was domestic trouble, and the predisposing heredity. She suffered from complete procidentia uteri. Elytrorrhaphy was done upon the anterior vaginal wall, the sutures being of silk worm gut, and the perineum was extended forward after Tait's method. There was not the slightest union in the perineal incision, or possibly it may have been separated

by pressure from the impacted rectum, which the nurse had not discovered. The recto-vaginal septum, and the outer wall of the vagina, however had become a granulating surface, over which the edges of the skin were again coaptated after deundation, and secured with silver wire sutures. Perfect union and complete cure of the procidentia was the result. For two or three months the mental condition markedly improved, but a relapse occurred which left the patient but little, if any better than before the operation.

Case 7.—M. S., Irish, aged 53, married, no children, had been insane ten years. Cause of insanity unknown, type chronic melancholia. The uterus was normal and the abdomen very much enlarged from an ovarian cyst. Ovariotomy was performed from which she made a good recovery. On the afternoon of the day of the operation the nurse had occasion to go into an adjoining room. Though only absent two or three minutes, when she returned the patient was at the other end of the hall, a distance of 30 feet. Fortunately no harm resulted. Her general health greatly improved, but there was not the slightest improvement mentally.

Case 8.—M. M. B., American, aged 38, married, never pregnant, insane three years, and religious excitement given as the exciting cause. Type of insanity recurrent mania. She suffered from dysmenorrhœa, due to stenosis of the cervix uteri. This was treated by rapid dilatation, and repeated after the second menstrual epoch, she improved sufficiently to return to her home, but after two or three months she relapsed into the same insane condition, though the dysmenorrhœa was permanently relieved.

Case 9.—M. L. D., American, aged 40 years, married, mother of one child ten years old, had been insane six months with acute mania. Her record showed "uterine trouble" as the predisposing, and "menstrual irregularity" as the exciting cause. She suffered from chronic endometritis and papillary angiomata within the urethra. The uterus was curetted, and drained with iodoform gauze, the growths snipped off with scissors, and the pacquelin cautery applied. She completely regained her mental and physical health. A report from her six months afterward stated that she had not been so well during her married life. In this case the exciting cause can fairly be attributed to the urethral disease, existing in an anæmic and debilitated patient. A disease more harrassing, and capable of producing a more complete wreck of a woman's nervous system seldom occurs. Disordered menstruation is the rule among insane women. Very few menstruate regularly and naturally, and some do not menstruate at all. The general health is usually broken down, and nutrition, of course, very much impaired. A diseased nervous system coëxisting with such a condition would naturally disorder the menstrual function. Scanty menstruation is the rule, but menorrhagia sometimes occurs, when it is generally due to uterine disease.

While disease of the sexual organs exists in a large proportion of insane women, the effect upon them of the cure of those diseases hardly establishes any direct relation between the two conditions, except in occasional instances, and when that relation exists disease of the sexual system is often rather a result than a cause. The relief of any coëxisting disease in an insane woman, whatever it may be, will be of benefit to her mentally just in proportion as her general health is improved. Pathological conditions are very much the same whether they exist in the sane or insane. Functional insanity may, of course, result directly from disease of the procreative organs, but that different types of chronic insanity are very frequently the result of those diseases may be questioned. The nerves and blood vessels are intimately related to the cerebral cell, and may interrupt or even prevent its development or reparation. For its life it depends upon the parent organism, and the cause of its perpetual change must exist in some way within the nerves or capillary blood vessels or both. Stimulation beyond the possibility of repair results in injury to the cell, therefore a pathological condition must result which interferes with the functions of the brain and insanity follows. Diseases of the reproductive organs in insane women and their management presents a vast opportunity for the gynecologist, and further observation will no doubt establish the exact relation existing between those diseases and insanity. Every insane hospital should have its gynecologist, not only to provide better care for this unfortunate class of patients, but to lighten the burdens and cares of the superintendent, who in most institutions has more than his share. The future for gynecology in this field is full of promise.

PURULENT BRAIN DEPOSITS, AND PHLEBITIS AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES FOLLOWING EAR DISEASE.

BY FRANK ALLPORT, M.D.,
OF MINNEAPOLIS, MINN.,
PROFESSOR OF CLINICAL OPHTHALMOLOGY AND OTOLOGY IN THE UNIVERSITY OF MINNESOTA, ETC.

(*Continued from page 528.*)

Case 47.—*Archives of Otology*, March 1882. Treated by G. S. Munson, of Albany, N. Y. Female, age 39. Left ear, chronic otorrhœa, has had partial left facial paralysis. Pain in left ear, vomiting, tinnitus aurium, no mastoid symptoms. Convulsions, right-sided headache, deafness, eustachian tubes closed, polypus in tympanum; its removal refused. November 15. Greater pain, delirium, unconsciousness, high temperature and pulse, coma. Convergent strabismus left eye, iris unresponsive. Death.

Autopsy—Polypus of ex. meatus, semicircular canals carious. Abscess of middle lobe of cerebrum, directly above the semicircular canals, and an opening in the meninges and brain tissue connected the semicircular canals and the abscess.

Case 48.—*Lancet*, August 13, 1887. Treated by J. P. Gray. Age 26. Chronic otorrhœa, pain in and behind ear, facial paralysis, fever. Apathetic, half-comatose, paralysis and anæsthesia of left leg, delirium. Mastoid opened; no pus. Coma, hemiplegia, hemianæsthesia, death.

Autopsy—Right cerebral hemisphere covered with pus. Perforation of dura mater upon posterior surface of petrous bone, carious opening through roof of tympanum, abscess between dura mater and petrous bone.

Case 49—Transactions American Otological Society. Treated by O. D. Pomeroy. Otorrhœa; death.

Autopsy.—Abscess (diffused) of anterior and upper third of right lobe of cerebellum, carious condition of tympanum, carious opening through roof of tympanum.

Case 50.—*Archives of Otology*, June, 1889. Treated by James Finlayson and Thomas Barr. Male, age 22. Right ear, chronic otorrhœa, acute exacerbation, fever moderate, giddy, pain in jaw and behind ear, vomiting, chills, pain in frontal and occipital regions, pain in back, head retracted, right facial paralysis, constipation, stupor, vomiting, death.

Autopsy.—Congestion of pia mater, purulent exudation in frontal convolution of both sides, purulent fluid at base, in the region of the medulla. Brain adherent near right internal auditory meatus; the extreme anterior end of right cerebellum necrosed. Purulent inflammation at base of brain, granulations in tympanum and mastoid antrum, malleus and incus gone. The facial nerve was much disorganized and denuded of its bony covering by caries.

The mastoid cells, with the exception of the antrum, were obliterated and converted into a sclerosed mass. Pus in the antrum, caries of tympanum, auditory nerve disorganized, cribriform lamina destroyed by caries. On the upper part of the petrous bone a caries aperture communicated with the cochlea. Bone over the superior semicircular canals was carious.

Case 51.—*British Medical Journal*, Dec. 11, 1886. Treated by B. Gowers and E. Barker. Age nineteen. Right ear. Chronic otorrhœa; pain in and around ear; fever; bilateral optic neuritis; vomiting; unequal pupils; mastoid opened; improvement, but still unequal pupils, and optic neuritis persisted; again vomiting; stupor, insomnia, delirium, fever and chills.

Operation.—Skull trephined one and one-fourth inches behind and one and one-fourth inches above the centre of the meatus, or, in other words, at the lower posterior angle of the parietal bone, near the squamous suture.

Antiseptic precautions were taken. An aspirator needle was introduced into the temporal lobe, inward, forward and downward, and pus evacuated. The opening was enlarged. The brain debris was removed. A drainage tube was employed.

The after-treatment consisted of irrigations with boracic acid solution. Recovery.

Case 52.—*Archives of Otology*, Vol. 12, No. 1. Treated by H. Knapp. Male, age thirty-nine. Right ear. Acute purulent otitis; pain in ear and head, especially in the right occipital region; later, pain, swelling and fluctuations in left occipital region; incision at this point; pus liberated; bone denuded; wound kept open; improvement. After a time patient became worse. It was ascertained that the pus in the occipital region came from the interior of the skull. Frontal headaches; insomnia; nausea; pale; chills; fever; swelling below original opening; incised; pus found; drained; some improvement; patient became worse again; optic neuritis both eyes; another swelling appeared, upward and backward from original opening; incised; pus found; drained; probe passed into cranial cavity; pain in right side of forehead; nausea; vomiting; delirium; coma. Death.

Autopsy.—The openings in the skull referred to in the history of the case were found. At the outer surface of the lateral sinus a thick streak of pus led along the transverse sulcus to a large collection of pus at the lowest part of the sigmoid fossa. Pus in mastoid cells and tympanum. Abscess in middle and outer part of the little brain. Not encapsulated.

Case 53.—*Archives of Otology*, March, 1880. Treated by H. Steinbrugge. Male, age fifty-eight. Right ear. Chronic otorrhœa; vertigo; pain in right parietal region and ear; neuralgia in third branch of right trigeminus; cholesteatomatous masses in meatus and middle ear; left arm and leg partially paralyzed; impaired vision; constipation; coma. Death.

Autopsy.—Fluid blood in all sinuses. Pia-mater congested. Right temporal lobe adherent to petrous bone. Abscess in right temporal lobe. Encapsulated. Surrounding brain substance sclerosed. Left optic nerve atrophied. Perforation through right petrous bone (anterior surface) and dura-mater. Carious opening in semi-circular canals. Drumhead and ossicles gone. Tympanum badly necrosed, so that it and the mastoid antrum are thrown into one cavity, all filled with cholesteatoma.

Case 54.—*Breslauer Aerztl. Zeitschr.*, No. 9, 1879. Treated by Otto Binswanger. Male, age fifty-one. Right ear. Neither discharge from his ears nor deafness has been observed; fever; loss of appetite; vomiting; paralysis of left arm; epilepsy; chronic convulsions; right pupil dilated.

Autopsy.—Abscess in right first frontal convolution. Encapsulated. Roof of right tympanum inflamed. Granulations in right tympanum and mastoid cells. Drum-head destroyed. Ossicles intact.

Case 55.—*Archives fur Ohrenheil*, 1879, No's 11 and 12. Treated by E. F. Kretschy. He publishes three cases of fatal purulent inflammation of the middle ear; histories not given.

Autopsy.—Thrombus purulent in left transverse sinus. Pus in jugular sinus, and a defect in its anterior wall, led to the necrosed petrous bone. Cholesteatoma in the tympanum. Fibrous tissue about jugular vein infiltrated with serum and pus.

Case 56.—*Archives fur Ohrenheil*, 1879, No's 11 and 12. Treated by E. F. Kretschy.

Autopsy.—Purulent infiltration of inner membranes of brain.

Case 57.—*Archives fur Ohrenheil*, 1879, No's 11 and 12. Treated by E. F. Kretschy.

Autopsy.—Abscess in left cerebellum.

Case 58.—Treated by Burckhardt. Female, age nineteen. Left ear. Chronic otorrhœa. Died of meningitic symptoms after an illness of sixteen days.

Autopsy.—Left trigeminus acousticus and facialis imbedded in pus. Purulent pia-mater. Thrombus in superior sinus. Caries of petrosal sinus canal. Polypus in tympanum. Mastoid cells absent.

Case 59.—Treated by Burckhardt. Age two and three-fourths. Death from tubercular meningitis.

Autopsy.—Partial necrosis of left wall of lateral sinus. Thrombus in lateral sinus. Carious openings of bony walls of sulcus transversus.

Case 60.—Treated by Burckhardt. Female, age seven and one-half.

Autopsy.—Ossicles gone. Caries of mastoid process. Caries of lower wall of parietal bone.

Case 61.—Treated by Burckhardt. Female, age two and three-fourths.

Autopsy.—Multiple caries on skull. Left drumhead gone. Malleus and incus gone. Necrosis of mastoid process.

Case 62.—*Archives of Otology*, December, 1879. Treated by Arthur Hartman. Female, age thirty-four. Left ear. Chronic otorrhœa; occasional acute exacerbations; painful mastoid; fever and chills: pain in left temple; delirium. Death.

Autopsy.—Anterior left hemisphere covered with pus, which extended to the base of the brain. Dura-mater over left tegmen-tympani was discolored and pierced by a few openings, beneath which a cavity full of pus was seen. The pus being removed, the tegmen was found to be perforated by a few small orifices which led into the tympanum. An abscess in the brain was discovered, corresponding in situation with that over the tegmen, and extending into the lateral ventricle, which, with the right and middle ventricle, was filled with pus. The spinal cord was surrounded by pus. Polypus in tympanum and some necrosis in that space. Both tegmen and antrum were perforated by small openings which led into the middle cranial fossa. Sclerosis of mastoid.

Case 63.—*Archives of Otology*, December, 1879.

Treated by Arthur Hartman. Male, age thirty. Left ear. Chronic otorrhœa; violent pain in left half of face, which led to facial paralysis; later, the pain involved the entire head; polypus in left middle ear; temporal bone not especially painful. Death.

Autopsy.—Purulent meningitis of posterior cerebral fossa, and an abscess in left cerebellum. The bony wall of facial canal carious. Caries of semicircular canal. Sclerosis of mastoid.

Case 64.—*Archives of Otology*, December, 1879. Treated by Arthur Hartman. Male, age thirteen. Right ear. Chronic otorrhœa; meningitis; swollen mastoid; Wilde's incision; pus liberated; delirium; coma. Death.

Autopsy.—Pus patches over brain surface. Pus at base of brain, especially at right cerebellum. Abscess in middle cranial fossa. Pus at sella turcica and left middle cranial fossa. Necrosis of tegmen-tympani. Tympanum carious. Mastoid sclerosed.

Case 65.—*Lancet*, June, 1880. Mr. Field. Male, age eighteen. Right ear. Chronic otorrhœa; pain in head. Death.

Autopsy.—Suppurative meningitis over right petrous bone. Inner mastoid surface at lateral sinus carious. Thrombus in lateral sinus. Abscess of right tempero-sphenoidal lobe and occipital lobe. Abscess in right cerebellum. Incus and stapes gone.

Case 66.—*Archives of Otology*, March, 1880. Treated by T. R. Pooley. Male, age forty-five. Left ear. Blow on left side of head, followed by deafness and otorrhœa; painful ear; tinnitus aurium; drum-head perforated; mastoid swollen, red and painful; mastoid opened; pus found; not much fever. Death.

Autopsy.—Abscess in left middle lobe. Left-sided pachymeningitis. Petrous bone carious, especially outer half of middle surface. Pus in lateral ventricle of right side of brain.

Case 67.—*American Journal of Otology*, January, 1881, page 26. Treated by C. S. Rodman, of Waterbury, Conn. Male, age twenty-one. Right ear. Chronic otorrhœa; occasional acute exacerbations; mastoid symptoms; mastoid opened; pus found. Death.

Autopsy.—Meningitis. Pus in neck between mastoid and styloid process. Mastoid carious. Caries in the inner plate of mastoid, at sulcus of lateral sinus. Caries of squamous. The lower surface of mastoid had three carious perforations in the groove next the tip of the mastoid in the digastric fossa, all communicating with the carious mastoid cells. Caries of mastoid antrum.

Case 68.—*Deutsche Medical Wochens.*, 1890, No. 48. Treated by E. Hoffman. He discovered in the course of an operation for mastoid abscess, an abscess in the occipital lobe, which he opened. Recovery.

Case 69.—*Dublin Medical Journal*, July, 1890. Treated by R. G. Patterson. Pyæmia, following a suppurating ear.

Autopsy.—Thrombus in the lateral sinus.

Case 70.—*Archives fur Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian. Female, age nineteen. Left ear. Chronic otorrhœa; meningitis. Death.

Autopsy.—Left circumscribed basilar meningitis. Fistula between mastoid antrum and superior petrosal sinus. Polypus in tympanum. No mastoid cells.

Case 71.—*Archives fur Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian. Left ear. Chronic otorrhœa.

Autopsy.—Caries of tympanum, antrum, mastoid cells and osseous wall of lateral sinus. Thrombosis of lateral sinus. Tubercular meningitis.

Case 72.—*Archives fur Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian.

Autopsy.—Caries of tympanum and antrum. Carious opening through outer wall of mastoid. Caries of parietal bone. Meningitis.

Case 73.—*Archives fur Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merion. Chronic otorrhœa.

Autopsy.—Necrosis of antrum and squamous. Meningitis.

Case 74.—*Medical Times and Gazette*, May 8, 1880. Treated by Johnson. Male, age fourteen. Right ear. Chronic otorrhœa; chills; headache; thoracic pains; unsteady gait; constipation; night sweats; pupils dilated; delirium; temperature and pulse not high; coma. Death.

Autopsy.—Double pleurisy. Pus in lungs. Pus in right internal jugular vein. Abscess at apex of petrous bone. Necrosis of petrous bone near labyrinth. Blood coagulum in sigmoid sinus. Pus in tympanum.

Case 75.—*Medical Times and Gazette*, May 8, 1880. Treated by Henry Thompson. Female, age twelve. Right ear. Tuberculous; chronic otorrhœa; headache; vertigo; vomiting; dilated pupils; temperature and pulse not high; chills; involuntary defecation; cough; thoracic pains; coma; convulsions. Death.

Autopsy.—Congestion of pia-mater. Right cerebellum adherent to dura-mater. Abscess in right cerebellum. Tubercular deposits in brain. Pus in right half of posterior occipital fossa. Pus in right sigmoid sinus. Thrombus in right internal jugular vein, sub-clavian vein, vena-cava and right auricle. Lungs abscessed. Tympanic cavity, vestibule, and semi-circular canal filled with pus.

Case 76.—*Archives of Otology*, December, 1888. Treated by Henry Ferrer, of San Francisco, California. Male, age sixty. Mastoid abscess; opened mastrid. Death from hematemesis.

Autopsy.—Pus and granulations in mastoid cells and tympanum. Meningitis.

Case 77.—*Archives of Otology*, December, 1888. Treated by Lewis, of Birmingham, England. Mastoid abscess. Death.

Autopsy.—Abscess in tempero-sphenoidal lobe.

Case 78.—*Archives of Otology*, December, 1888. Treated by Lewis, of Birmingham, Ennland. Mastoid abscess. Death.

Autopsy.—Phlebitis of lateral sinus.

Case 79.—*Archives of Otology*, December, 1888. Treated by Thomas Barr, of Glasgow. Male, age twenty-one; left ear; chronic otorrhœa; headache; slow and intermittent pulse; normal or sub-normal temperature; contraction of left pupil; paresis of all ocular muscles excepting external rectus; partial right facial paralysis; paresis of right arm, with wrist-drop; mastoid opened; no pus found; skull trephined above the external meatus; brain tissue pierced with trocar; pus found; cavity irrigated; chicken-bone drainage tube; antiseptic dressing; dressing not removed for three weeks; the opening filled in with bone. Recovery.

Case 80.—*Archives of Otology*, December, 1888. Treated by Roosa, of New York City. Female, age forty-two. Left ear. Advanced Bright's disease; acute otitis; drum-head lanced; pain and tenderness at

junction of temporal and occipital bones; temperature moderately high. Death.

Autopsy.—Caries of tympanum. Pus in middle ear. Seventh nerve exposed and imbedded in pus. No mastoid disease. Meningitis.

Case 81.—*British Medical Journal*, April 14, 1888. Treated by Arthur E. Braker. Male, age thirty. Right ear. Chronic otorrhœa; lateral sclerosis of spinal cord; acute exacerbation; pain in right half of head; vomiting; epilepsy; contraction of right pupil; mastoid opened; no pus; rapid emaciation; incontinence of urine; stupor; somnolence.

Diagnosis.—Abscess in tempero-sphenoidal lobe.

Operation.—Parietal bone trephined; dura-mater incised; no pus; trephined again one and one-half inches above and one and one-quarter inches behind the external meatus; a needle was passed one and one-half inches deep, forward and inward; pus found; rubber drainage tube; iodoform dressing. Recovery.

Case 82.—*New York Medical Journal*, February 25, 1887. Treated by Abbe. Acute otitis media; acute meningitis; choked disc on same side. Death.

Autopsy.—Purulent meningitis at base of cerebrum and lower surface of cerebellum. No evidence that pus had extended from the ear. The internal auditory canal showed streaks of pus, following the course of the nerve.

Case 83.—*Archives fur Ohrenheil*, vol. 26, page 84. Treated by Schmiegelow, of Copenhagen. Male. Right ear. Chronic non-suppuration; inflammation of the middle ear; suddenly seized with neuralgia of all three branches of right trigeminus, followed by right facial paralysis; right choked disc; later, purulent otitis; pain; mastoid inflammation; mastoid opened; pus and granulations found; œdema of right side of face; skull trephined at posterior cranial fossa; no pus; mastoid opening enlarged backward; improvement; later, nausea; fever; headache; vomiting; unconsciousness. Death.

Autopsy.—Diffuse purulent lepto-meningitis. Abscess in temporal lobe of cerebrum.

(To be continued.)

CASES ILLUSTRATING THE MODERN TREATMENT OF WOUNDS, AND THE PRINCIPLES OF ANTISEPTIC SURGERY.

Clinical Lecture delivered Oct. 1, 1892, before the Clinical Class at the Pennsylvania Hospital.

BY PROF. THOS. G. MORTON, M.D.,

ONE OF THE ATTENDING SURGEONS TO THE HOSPITAL; PROFESSOR OF ORTHOPÆDIC SURGERY IN THE PHILADELPHIA POLYCLINIC; SURGEON TO THE ORTHOPÆDIC HOSPITAL OF PHILADELPHIA.

Gentlemen:—This morning I begin my twenty-ninth annual course of clinical lectures in this hospital. I cannot do better than to devote the first part of my hour to day to the consideration of the method which I will follow in the treatment of wounds. Before showing you any cases, therefore, I propose making a few remarks upon the principles of antiseptic surgery, which we endeavor to carry out in all our operations. To some of you who have been in attendance upon these lectures in previous years, our practice here is well known; but others are here for the first time and are just commencing their studies; to these I may explain briefly the theory and practice of aseptic surgery, which will avoid the necessity of repetition and of going over the same explanation time after time after every operation during the winter, Moreover, even those to whom the antiseptic dressings are no novelty may not thoroughly appreciate the principles involved, and when they attempt to practice this system for themselves they may overlook the essential part and meet with disappointment. This is very frequently the case with physicians who think that they understand how to practice antiseptic surgery, and get unsatisfactory results, which tend to bring modern wound treatment into discredit while the fault lies entirely with themselves.

For many years, I have been using antiseptic methods in the treatment of injuries and wounds after operations, and since it was first introduced into this hospital a number of years ago, I cannot say that there has been any decided change in our methods; the results have always been so satisfactory that there has been no need of change. During this period, it is true, many minor modifications and supposed improvements in detail have been brought out by surgeons; but I cannot say that I consider them as possessing real advantage. For instance, one surgeon will bake his knives for two hours before operation; another will use only dry dressings upon wounds; still another will have some special antiseptic like biniodide of mercury or lysol; but I have not found it necessary to depart from the original methods whose value has been established by many years' experience. The antiseptic method has for its object the preservation of an aseptic condition of wounds. You may ask "Why is this necessary." Let me state at once that suppuration is a fermentation or putrefaction which goes on in wounds and which the antiseptic system is designed to prevent and protect from. Three elements are essential in order to produce this species of infection: 1. Warmth. 2. Moisture. 3. Germs.

Now, if we can exclude the germs, putrefaction will not occur, even though warmth and moisture are present; and in the same way if either of these are missing, there will be no putrefaction, even in the presence of the germs or bacteria, which, by the way, are generally present in the air, which carries them to the surface of the wounds or other places where they meet warmth and moisture, and the combination being complete, they rapidly increase. Precautions may be taken to prevent this combination so that putrefaction cannot occur, for without bacterial growth there can be no putrefaction or suppuration. Let me give you a homely illustration of this fact. Here is a case of condensed milk, which is hermetically sealed. Here is warmth and moisture; but the bacilli of the air are excluded and it is impossible to ferment as long as it is sealed up; if it were to be opened, however, and the air allowed to enter, its contents would soon be attacked by putrefactive germs, which now are excluded. Here, I give you another illustration in a piece of jerked or dried beef. The bacteria can get at it and warmth is here, but no moisture, consequently it remains sweet; if it were placed in a bucket of water, it would be attacked by bacteria in a few hours. On the other hand, when we wish to preserve food in summer time we place it on ice, or in a cold place, and the germs and moisture cannot affect it in the absence of the necessary degree of temperature. The art of preserving food by excluding germs, as in canned meats,

is not altogether new since jars of preserves have been found in Pompeii, which, being hermetically sealed, had kept their contents sweet for centuries. It is evident that the ancient inhabitants of Pompeii appreciated the fact that heat and moisture would not produce fermentation, and that if the germs were excluded the preserves would keep. Then if we exclude the germs there will be no putrefaction; if we exclude moisture, there will be no putrefaction; and if we exclude warmth, there will be no putrefaction. Now, we have the germs in the air, everywhere around us. If we expose an unprotected raw surface for a very short time, germs will be deposited and in the presence of warmth and moisture, they rapidly multiply, and we will have set up the condition of suppuration, which is a form of septic infection of a wound. To prevent this infection is the problem of antiseptic surgery. In the living body, we must have warmth and moisture, we are obliged therefore to direct our efforts towards the exclusion of the germs and to the prevention of their growth by means of antiseptics.

You may ask, "What are antiseptics?" In brief, they are agents which destroy the vitality of germs. We have many remedies of this kind at our command, and new ones are constantly being introduced, but we have held fast to the one we first used, the bichloride of mercury, in solution in distilled, or recently boiled and filtered water. It is true that objections have been raised to its use because it occasionally causes irritation in a delicate skin and when freely used upon a large wound it may be absorbed and produce symptoms of mercurial poisoning; occasionally a nurse who has her hands frequently in it may be affected by it and have to lay off for a couple of weeks or so, but with ordinary care such accidents rarely happen. Of course, in abdominal operations, we do not use bichloride solutions; if we should sew up the abdomen and leave a couple of ounces of this solution within the peritoneal cavity, we would surely have mercurial bichloride poisoning; but for general use on the surface of the body and for small wounds, no such accident need be thought of. For the preliminary washing off of the skin a solution of $\frac{1}{1000}$ is used; for wounds a solution of $\frac{1}{2000}$ or $\frac{1}{4000}$; except in poisoned wounds, where we may apply a solution of $\frac{1}{500}$.

Here is an illustration of the application of this system, in the patient now before you:

"Frank B., 14 years of age, a well developed boy, who was injured by machinery on Sept. 23, and was at once brought into this hospital. His left arm was crushed and the tissues lacerated nearly up to the shoulder. On the day of admission, amputation was performed in the upper third of the arm. Previous to the operation the surface of the skin of the injured arm was scrubbed clean with soap and water, and afterwards washed with ether and finally with bichloride solution." The stump is a little ragged because I had to make the most of what tissue was left. The dressings applied a week ago, I will now remove. You notice there is a little moisture due to oozing from the wound, but not a drop of pus. The wound is perfectly sweet. My only object in exposing the wound now is to remove the drainage tube which was put in at the time of operation in order to prevent retention of the secretions in the deeper parts of the wound, and which being no longer needed can be removed and the wound allowed to heal up. Except along this track, the wound has united by first intention and the gut sutures have been absorbed. There are no ligatures to come away, because the gut ligatures which were used have also been absorbed. I find here a small spot of dead cellular tissue at the upper part of the wound, which was probably devitalized by the injury. The dressings will be applied as at first, and I have brought him before you in order that you may see the details of the method. The great object in view is to secure cleanliness, and all the dressings must be scrupulously clean; the antiseptic agent is only a help in this direction, the real essential condition being cleanliness, This is proved by abdominal operations where we are obliged to do without the bichloride and rely upon recently boiled, sterilized water and accomplish the object in this way. The bichloride, however, is a very efficient antiseptic; should any germs happen to get into the dressings they could not live in such an atmosphere.

Before touching the dressings or the patient I carefully scrub my hands with soap and hot water and follow this by ether and the bichloride solution ($\frac{1}{5000}$). All instruments and utensils have been sterilized by boiling water. The stump is also rendered aseptic by douching and scrubbing with bichloride solution and washing with ether. Over the line of the incision is placed some varnished silk protective in order to facilitate escape of the discharge if there should be any. This is placed directly along the wound, and then the surface is well dusted with iodoform. I do not think that iodoform is an antiseptic, but it favors healing and keeps the wound clean. Except for the expense, I would prefer aristol for this purpose, on account of its freedom from the peculiar odor which is the great objection to iodoform. Upon the well dusted surface, we place a compress of ordinary gauze wet with a solution of bichloride ($\frac{1}{2000}$), several thicknesses being used. The dressings are then confined by a roller bandage, also of gauze wet with the same solution. A layer of cotton batting, or dry absorbent cotton, is now used to envelope the stump, and a roller bandage applied to keep everything in place. These dressings need not be disturbed for a fortnight. This is precisely the same mode of dressing wounds which I used years ago, and which, I find, fully accomplishes the purpose of keeping germs out of the wound and preventing infection and suppuration. I have used it in all amputations, even of the thigh, resections, and other operations, and even these large wounds heal by first intention. It is wonderful that such serious injuries should be followed by so little disturbance of the system and so few symptoms. In this lad, for instance, the brachial plexus was exposed in the wound and the median nerve lacerated and pulled out. I can only attribute the favorable course of the case, to the prompt performance of amputation and the prevention of fermentation in the wound by the use of antiseptic dressings.

I will now show you a different kind of a case in which an operation will be done for removal of a tumor of the breast. While the patient is being etherized, I will read you her history:

"Jane T., a widow, 68 years of age, a seamstress by occupation, was admitted yesterday, Sept. 30. She states that four years ago having previously enjoyed good health. she fell and struck her right arm, causing dislocation of the shoulder. Shortly afterwards she noticed the presence of some lumps in her right

breast. In June, 1889, she was admitted into the hospital and the breast was found to be cancerous and was removed by my colleague, Dr. Hunt. She made a good recovery; but about a year ago she observed a growth in the cicatrix, which slowly increased until it attained its present size, which is that of a good sized orange. It is purple in color, hard, has many vessels visible upon the surface, and has begun to ulcerate. It causes constant pain which at times is sharp and lancinating. Her general health has declined, she is quite thin and her appetite is poor. Her urine has been examined and found free from sugar or albumen." Here is a fungoid growth following an amputation of the breast and is undoubtedly malignant. When we take into consideration the age, sex, and history of the patient, and the locality of the growth, there can be no doubt as to the diagnosis being correct. The mammary gland in the female is a favorite site for carcinoma, and this is especially likely to occur where the breast has been previously affected by inflammation, or "gathered breast," during lactation, in earlier life.

In operating, the field is cleaned as in the preceding case, with soap and water, ether, and bichloride solution, the axilla having been shaved just before beginning operations. The growth is then removed by being included between two curving incisions. It is better in these cases to tear out the growth, cutting as little as possible, so as to thoroughly remove it. All hard spots in the adjacent muscles or cellular tissue are also removed, and all suspiciously hard lymphatic glands found in the neighborhood. Bleeding vessels are at once seized with the hæmostatic forceps and subsequently secured by applying catgut ligatures. I have the surface frequently irrigated by the weak bichloride solution ($\frac{1}{4000}$) during the operation. Having found that the old cicatrix is hard, I will also remove that. We have now a large gaping wound over which the skin can be brought as in a plastic operation. As the wound is superficial, a drainage tube will not be required. Catgut, interrupted, double-knotted sutures are employed, the protective is placed over the incision, iodoform dusted on freely, including the arm pit, and the gauze compress bandage, cotton and retaining roller used as on the previous case. The arm was directed to be kept to the side, to prevent traction upon the sutures, and an anodyne directed to be administered.

The modern treatment of tumors of this kind is repeated operation. There are cases, in which there has been a recurrence after extirpation twelve or thirteen times, and life has been prolonged many years. Such growths should be excised as early as possible, and the operation repeated as often as it returns. I would operate in this case, even if I knew that her liver had been invaded by secondary growths, for the reason that this tumor is beginning to ulcerate, and in the course of a few weeks, the entire surface would be converted into a foul ulcer, having such a decided odor as to make her associates very uncomfortable, so that her existence would be almost unbearable; while her strength would be undermined by the discharges, and possibly by hæmorrhages from this foul, fungous growth. This operation will cover the surface with skin and get rid of this mass of malignant growth.

While the rule is to operate, I must acknowledge that it is also the rule that the growth will sooner or later return. In my own experience of nearly thirty years in this hospital, the longest period of exemption after operation which I have seen was eleven years. In a letter which I received from Professor Agnew a short time before his death, he informed me that seven years was the longest period any of his patients had survived amputation of the breast for mammary carcinoma.

HOW TO STERILIZE MILK.—We have recently been conducting experiments upon this subject, with results so satisfactory that we are glad to be able to communicate them to our readers. The first experiments were made with a tin receptacle capable of resisting a pressure of 25 lbs. This was partly filled with water and placed in boiling water, to the action of which it was exposed for half an hour. The pressure indicator showed no very considerable increase in pressure within the closed receptacle. We then tried boiling the tin vessel in a saturated solution of salt in water, when the pressure, as indicated by the pressure gauge, rose to 4 lbs. This was the result which we expected. We accordingly proceeded to a further experiment, which consisted in boiling milk tightly sealed in strong bottles in a saturated solution of salt. Milk sterilized in this way, by boiling in the salt solution for half an hour, will keep perfectly for an indefinite length of time. We opened, a few days ago, a bottle of milk which had been thus sterilized last June (1891), and found it to be as fresh as when placed in the bottle. It is only necessary to take the precaution to allow the solution of salt in which the bottles are boiled to cool before removing the bottles. If the bottles are removed from the solution while hot, they will almost instantly burst. The vessel containing the bottles of boiling milk should be set aside and allowed to cool gradually, when the bottles should be removed and placed in an ice chest or an ordinary refrigerator. Ordinary soda-water bottles are excellent for the purpose; or beer bottles may be used. Ordinary corks may be used for the purpose, but they should be previously boiled for half an hour. They should be pressed in tightly, and fastened with wire or with a patent fastener. After the bottles have been cooled and removed from the boiling kettle, the tops should be carefully dried and, if corks are used, covered with sealing wax, such as is ordinarily used for canning purposes.

The efficiency of the salt solution is due to the fact that its boiling point is 227° F., while that of boiling milk is less than 200° F. By using different salts, a still higher temperature may be attained. For example, a saturated solution of carbonate of potash, or saleratus, boils at a temperature of 275 F., while a saturated solution of chloride of calcium boils at 355° F. These high temperatures are, however, unnecessary.—*Bacteriological World.*

ON PERIPHERAL NEPHRITIS IN TYPHOID FEVER.—Dr. Judson S. Bury arrives at the following conclusions from a consideration of such facts as have been recorded, and from a study of two cases which have come under his own observation: "In one set of cases we may suppose that the action on the nerves is too slight to give rise to outward manifestations, or that these are masked by the general symptoms of the fever. In another set of cases the toxic influence on the nerves appears to be revealed by a series of irritative phenomena, such as neuralgic pains, cutaneous and muscular hyperæsthesias, exaggerated reflexes, and cramps and contractures of various muscles; while, in a third group of cases, the presence of an atrophic paralysis, its distribution, progress, and associations, leave little doubt on the mind of an observer that he has to deal with a genuine parenchymatous neuritis, and frequently with one of wide distribution throughout the body."—*The Medical Chronicle.*

GLYCERINE IN HEPATIC COLIC.—Dr. Ferrard concludes a communication to the French Academy as follows: 1. Glycerine administered by the stomach is absorbed in its natural state by the lymphatics, especially by the vessels which lead from the stomach to the hilum of the liver, and to the gall-bladder; it is even found in the suprahepatic veins. 2. It is a powerful cholagogue, and an excellent remedy for hepatic colic. 3. In relatively large dose (20 to 30 grammes), glycerine brings an end to the attack. 4. In small doses (5 to 15 grammes), taken each day in a little alkaline water, it prevents new attacks. 5. Glycerine, without being a lithotriptic, is nevertheless a valuable agent in biliary lithiasis.—*Journal de Médicine. de Paris.*

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SATURDAY, NOVEMBER 5, 1892.

THE ELECTION.

Within a few days every American citizen will be called upon to exercise his privilege of franchise in voting for the chief executive and legislative officers of the Nation. After the experience of the past two years in vain efforts made to induce Congress to enact a law creating a Cabinet Officer of Public Health, with the subsequent history of conflict between National and local health authorities, the medical profession should be exceedingly careful in finding out the views of congressional candidates on these subjects, which are as vital to the welfare and prosperity of our country as that of the tariff or free trade.

In the States where governors and legislatures are to be elected, similar knowledge of the attitude of candidates should be found out and made known. Instances are not wanting where the governor of a State has to some extent brought disrepute upon our profession by the appointment of unsuitable persons as members of the State Board of Health, with the operation of which the whole medical profession is most intimately affected, and again in the appointment of a professional fledgling as Surgeon-General of the State National Guard.

Knowing as we do, that there is no interest paramount to that of the physical welfare of the people, and of physicians to that which most intimately concerns themselves and families, it behooves us to act together as one man when we go to the polls next Tuesday, and there vote only for the men who give us a reasonable assurance that they will treat our professional interests with the respect which is their due, and favor by their acts such legislation and appointments as may be shown to be necessary and in accord with the enlightenment and learning of our art and science. This is not written in the special interest of the candidates of any political party, but for the purpose of arousing physicians to a sense of their political duty to themselves. Our professional interests are as important to us as the affairs of the manufacturer and merchant to those engaged in such occupations. We can make ourselves heard at the polls. That is our ultimatum. Let us turn our faces steadily in that direction, act together according to the lines above indicated, and it won't be very long until we will be inquired of as to what we want. One effort for one day in holding tickets at the voting precincts will not be thought of as undignified or a violation of professional integrity, when we remember that such an act was done with a right motive,—a securing of the elevation and protection of the medical profession.

MEDICAL TEACHERS AND TEACHING.

The effort to raise the standard of preparation for medical study, and lengthen the course meets the hearty approval of all. But is there not needed some changes among teachers and methods of teaching? Are the medical colleges doing their work along the advanced lines of medical progress? The evils that are so apparent in the short hurried studies of young men both unprepared and unfitted for professional life are not unfrequently traceable to the teachers and their methods.

Somewhere in the past an eminent teacher was invited to read a paper before a Section of the Association at its annual meeting. He declined with thanks, giving as a reason that there was really nothing new in that field worth writing about. This is a good illustration of many surgeons, who honestly think the entire field of medicine has been explored: To them there are no frontiers of mystery, everything is clear and arranged into distinct sections, which are always the same, with but slight variations. Such teachers are literally index men, who spend their time in arranging and grouping symptoms, and who teach medicine as a great structure, with great foundations, built up in systematic layers, of etiology, symptomology, pathology and treatment. They teach that the arrangement of the facts of disease, its diagnosis, symptoms and remedies, are the only definite entities of medicine. The knowledge of which is largely one of memory, and the practice of which is that of collecting and arranging them in groups, so as to be reached practically with drugs. Until recently the examination papers of graduates brought out this observation, that proficiency was simply a matter of memory, that teachers had simply been mapping diseases and their remedies as definite facts, that never varied. The student started out with the assurance that symptoms, terminations and remedies were always the same, and as a result they failed, or became mere commercial men, who made money the main object of life.

Text-book teachers always narrow and limit the range of science: They teach as ultimate and absolute truths that which is often contradicted by experience. While it is necessary to teach a certain definite grouping of facts with a certain possible meaning, it is dangerous to give the impression that these are absolute truths. Many of the incompetents who come from colleges are crippled by this false method. They go out to practice trusting to their memory of the lectures, and supplemented by text books. They are astonished and confused at the wide variations between teachings and practice. The result is that few ever become original thinkers or investigators. The teacher is responsible. Medicine has been taught as a mass of facts simply; no inspiration, no enthusiasm to go beyond the externals, and understand the relations of the almost endless links in the drain of life; the entire time has been spent in analyzing each separate link and reducing it to a mathematical formula; everything is defined and explained, and the very spirit of medcine is crushed out. Such teachers are everywhere, in all colleges, literary and scientific. Dogmatic formulists, who always talk about "grand principles," and never go beyond definition and exact description.

Medical schools must teach something more than exact formulas and explanations. The student must be taught to study and investigate for himself, beyond all lectures and text books. He must be taught that these are only guides and aids, and that the real facts are often far beyond these levels. The prize winner and the class scholar who has answered all the questions may be a mere parrot, who after a time becomes a teacher, and narrows the range of science to his dead level of index classification. Such men are blind leaders of the blind, and the unfortunate student who passes through such hands is dwarfed and crippled as a scientific man, or loses half a life time in unlearning and correcting the errors of his medical instruction. This may seem extravagant, but a casual observation, among the incompetent men of the profession, will indicate its truth. How few men are original thinkers and students? How many men trust to the teachings of a text-book and their memory of college lectures? How many men are hunting for specifics and combinations of drugs to do this or that? How many articles in journals are devoted to explanations of symptoms and diseases? How many works arrange and group the supposed facts of medicine as if they were mathematical truths? These and many more queries suggest that raising the standard of preparation for medical study will not of itself bring into the profession better medical men.

We must have medical teachers who are scientific students and explorers, who teach the spirit of truth as well as the letter. Teachers who can inspire the student with something more than a text-book conception of the relation of facts. Then we shall have men in the profession who are always students, always investigating on the road from the lower to the higher. There are such teachers and colleges, but we sadly need more of them.

ANENT this subject, medical teachers and teachings, we observe that the question of a higher standard of medical education is proposed for the consideration of a convention of the two-term-no-requirement Southern Medical Colleges, called to meet at Louisville on the 16th of November, prox., a subject that has already been settled by the Association of American Medical Colleges.

In his public address PROF. WM. T. BRIGGS, President of the American Medical Association, demanded at Washington, D. C., in May, 1891, the exclusion from membership in that body of all the faculties of the two-term-no-requirement schools; and proposed a united stand in favor of the minimum standard of requirements of the College Association.

The convention called to meet in Louisville is expected to extricate the schools that are now operating upon the two-term plan from the dilemma into which their defiance of the resolution of the American Medical Association and the requirements of the College Association have placed them.

Instead of living up to the standard unanimously adopted by the National Convention of Medical Teachers assembled at Nashville, Tenn., May, 1890, the two-term schools hope to bridge over the present session on the promise of coming into the three-course graded system next year. They are now ready to admit they are not able to fulfill their promises to the student this year, but promise to reform next year.

Unless we greatly mistake in our reading of the signs of the times, the dawn of the day is not far hence when there will be a complete uniformity of prelimary requirements, length and number of terms of study, for the student in all American Medical Colleges, and that there will be a similar uniformity of requirement to enable a physician to practice his profession in all of the United States.

The accomplishment of these aims and ends is a fruition of the supreme purposes of the American Medical Association.

THE Preliminary Announcement of the First Pan-American Medical Congress is fresh from the office of the Secretary-General. It is imposing in size and appearance, and contains a vast amount of information pertaining to the meeting of the Congress.

The importance of this general meeting of physicians representing all countries of the Western Hemisphere cannot be overestimated. The intelligent and well directed labor of the officers of the Congress as indicated in this announcement gives an assurance of pronounced success. In

order to accomplish the effective work already done by the officers of the Congress, it has been necessary to expend a very considerable sum of money for clerk hire, stationary and postage. This expense account has been met by voluntary advance registrations of those who expect to attend the sessions of the Congress. It is very much desired that every one who expects to become a member of the Congress will transmit the registration fee of $10 to Dr. A. M. Owen, Evansville, Ind.

American Public Health Association.—The twentieth annual meeting, that will convene in the City of Mexico, Old Mexico, November 29, 30, December 1 and 2 inclusive, promises to be one of the most interesting that has been held since the Nashville meeting of several years ago.

Dr. Liston H. Montgomery, of Chicago, has made arrangements with several of the railroads that lead from Chicago to Mexico—which he considers the banner route to be selected, and the topography of the country traversed and favorable auspices offered is certainly an opportunity that has seldom been afforded to any other organization.

The itinerary of route to be traversed is as follows, in special Pullman sleeping and buffet cars, without change during the entire going and returning journey: Going, leave Chicago via the Chicago and Alton R. at 11 A.M. Saturday, November 19. Arrive at St. Louis in time to leave that city at 8:10 P.M. of same day, via the St. Louis, Iron Mountain and Southern R. R., stopping over Sabbath at Hot Springs, Ark., thence Monday A.M. November 21, to Texarcana. Thence via the Texas Pacific R. R. to Longview, Tex.; thence over the International and Great Northern R. R. to San Antonio. Southern Pacific R. R. to Eagle Pass. Mexican International R. R. to Torreon, Mexico; Mexican Central R. R. to City of Mexico. From El Paso there is a choice of any one of the following three routes to return by, namely: Texas Pacific R. R. to Dallas, thence over the Missouri, Kansas and Texas R. R. to Hannial, Mo., and Chicago, Burlington and Quincy R. R. to Ohicago; or Texas Pacific R. R. via New Orleans and Illinois Central R. R. to Chicago; or return as the going trip, via the Iron Mountain and Chicago and Alton railroads to Chicago.

Luxuriant appointments and perfect convenience is assured. The railroad fare is one-half rate for the lowest limited fare one way, tickets valid until December 31, or return earlier if desired. For further particulars, address Dr. Montgomery, 70 State St., Chicago, John E. Ennis, District Passenger Agent, Iron Mountain route, 199 South Clark St., Chicago, E. D. Spencer, Northern Passenger Agent Missouri, Kansas and Texas R. R., Room 12, Rookery Bld'g, Chicago.

In view of the public interest at the present time centering in epidemics, it is hoped a large number will avail themselves of this splendid and rare opportunity and exceeding low railroad fare and the commutated rate in sleeping car accommodations of attending this meeting.

DOMESTIC CORRESPONDENCE.

To the Editor of the Journal of the American Medical Association:

Dear Sir:—In your issue of The Journal of October 29, 1892, p. 510, you have published an article entitled "Observation of a Case of Purulent Otitis Media, Cerebellar Abscess, and Death in Three Weeks," as "read in the Section of Laryngology and Otology, at the Forty-third annual meeting of the American Medical Association, held at Detroit, June, 1892, by C. H. Burnett, M.D., of Philadelphia, Pa." Permit me to state that I read no paper with this title at the time and place stated above, but I did read one entitled "Observation of a Case of Acute Purulent Otitis Media, Cerebellar Abscess, and Death in Three Weeks," which has been published in full in the *International Medical Magazine*, Sept., 1892.

That which follows the incorrect title of a paper erroneously ascribed to me, in your issue of Oct. 29, 1892, is composed first, of *remarks* made by me in the discussion of Dr. Knapp's paper and others of a similar nature, and, secondly, that part in heavier type, of remarks made by me in closing the discussion on a paper I presented at the above mentioned meeting of the Section, entitled "Some Observations upon Excision of the Membrana Tympani and the two Largest Auditory Ossicles," which paper has already appeared in full in the Journal of the American Medical Association for Oct. 22, 1892.

Had I been allowed to see a proof of this article incorrectly ascribed to me, before it went to press, this mortifying error would not have occurred. Doubtless it has been due to a reportorial blunder. By publishing this note at the earliest moment you will aid materially in setting me in a true light before the readers of your valuable Journal and also greatly oblige, yours sincerely,

C. H. Burnett, M.D.

[The matter referred to by Dr. Burnett was published just as prepared for The Journal by the officers of the Section.—Ed.]

SELECTIONS.

Chemistry of Digestion.—Dr. A. L. Gillespie points out that, though hydrochloric acid is a powerful antiseptic and capable, in dilutions of 1 to 2 per cent., of inhibiting or destroying most minute organisms, the addition of proteid matter to it, and formation of what he terms proteid-hydrochlorides in the process of digestion, allows the same organisms to flourish luxuriantly, though the strength in acidity be maintained. After a meal consisting largely of proteids, generally an hour elapses before the advent of free hydrochloric acid, and the gastric juice is therefore much less antiseptic than after a meal of carbohydrate material. It is suggested accordingly that, since a typhoid or other pathogenic bacillus ingested during a heavy dinner has a more favorable opportunity for development than if it were taken with such food as porridge, it would be well, if there were any danger of poisoning by disease germs, to take nothing with a proteid meal except it had been thoroughly cooked, or, as alternatives, to live chiefly on carbohydrates, or to take some dilute hydrochloric acid after each meal.—*Medical Magazine.*

The Period of Invasion of the Prostatic Urethra in Cases of Acute Gonorrhœa.—Heisoler, in the *Perter Medicinische Chirgurgie Presse*, 1891, reports the results of his investigation of fifty cases of gonorrhœa. He finds that in twenty per cent. the prostatic urethra becomes affected in the course of the first week; in thirty-four in the course of the second week; in fourteen per cent. in the course of the third week; in twenty per cent. in the fourth week; in four per cent. in the sixth and seventh week, and in two per cent. in the second and third months. According to the author the constitutional condition does not play any rôle in the etiology of posterior urethritis.—*Univ. Med. Magazine.*

A New Local Anæsthetic.—It is reported in the Institute of Medicine in Mexico an alkaloid producing local anæsthesia has beeu discovered in the plant commonly known as "blood weeper."

BOOK REVIEWS.

ADDRESSES AND ESSAYS. By G. FRANK LYDSTON, M.D. Second Edition. Renz and Henry, Louisville, Ky.

In this neat and attractive little volume Dr. Lydston has gathered together some of his late contributions. We had occasion some months ago to review the first edition of these essays, and this, the second edition, comes to us increased by the addition of several late monographs.

The following are the subjects dealt with: Evolution of the local venereal disease, gonorrhœa in women, hypertrophy and hyperplasia consequent upon lesions of the genitalia, aberrant sexual differentiation, a plea for early operation in acute peritonitis, studies of criminal crania, materialism *vs.* sentiment in the study of crime, the *rationale* of extension of the spine, tropho-neurosis in the phenomena of syphilis, varicocele, observation on stricture of the urethra, the treatment of syphilis, sexual perversion, urethral and genital neuroses, a case of circinate papulo-erythematous syphilide with psoriasis palmaris syphilitica.

Where there is so much that is good it would seem invidious to single out special topics for particular mention. We cannot, however, let the occasion pass without calling special attention to the chapters on hypertrophy and hyperplasia consequent upon lesions of the genitalia, and tropho-neurosis in the phenomena of syphilis. These two monographs form an able and philosophical discussion of these subjects that will be sought elsewhere in vain. Dr. Lydston clearly differentiates the true syphilitic lesion from the more or less variable phenomena that follow syphilis, and which are similar in many respects to pathological conditions entirely disconnected with that disease. He also clearly points out that it is not the mere association of syphilis and some disease that places the former in an etiological relation with the latter, but that the syphilization acts as a predisposing factor, by lessening the resistance of tissues. In this is furnished an explanation of the uselessness of antisyphilitic treatment in so many cases in which syphilis is thought to be an etiological factor. In these cases the lesion has ceased to be syphilitic, and remedies that ordinarily control those conditions are no longer effectual.

The articles on the study of crime, sexual perversion and criminal crania, show a wide grasp of these difficult subjects. The classification of sexual perversion proposed by Dr. Lydston has been extensively adopted by American alienists.

The volume as a whole displays marked originality of thought, clearly and logically expressed. We can recommend the "Essays" not only to the studious and thoughtful physician, but also to the active practitioner engaged in his daily battle with disease.

MISCELLANY.

THE CHICAGO GYNECOLOGICAL SOCIETY held its fourteenth annual meeting at the Grand Pacific Hotel, Friday evening, October 28, 1892. After the banquet the topic for discussion was: "How Best May we Further the Interests, Scientific and Social, of the Society, During the World's Fair Year?" Officers for the ensuing year were elected as follows: President, Dr. E. J. Doering; First Vice-President, Dr. F. Henrotin; Second Vice-President, Dr. Franklin H. Martin; Secretary, Dr. Henry Parker Newman; Treasurer. Dr. A. H. Foster; Editor, Dr. W. S. Christopher.

ON the 27th of October the Hospital College of Medicine, Medical Department of the Central University of Kentucky, abolished the clinical lectureship on the eye, ear and throat, heretofore occupied by S. G. Dabney, M.D., Professor of Physiology.

MEETING OF THE INTERNATIONAL MEDICAL CONGRESS (AMERICAN PUBLIC HEALTH ASSOCIATION) in the city of Mexico, Nov. 29th., 30th., and Dec. 1st. and 2nd., 1892., the elegant special Pullman Car to convey the delegates and their families from Chicago to the city of Mexico and return, will leave Chicago Nov. 19th., 11 A.M. The car is rapidly filling up. Among the number who have engaged space are: Dr. C. M. Hewett, wife and daughter, Red Wing, Minn.; Prof. DeLaskie Miller, Chicago; Prof. R. C. Kedzie, Michigan; W. A. Morrison, St. Louis; Dr. E. S. Cook, Mendota, Ill.; Dr. C. C. Hunt, Dixon, Ill.; Mrs. L. Miller, Cincinnati: Receptions will be given the party at Hot Springs, Ark. San Antonio, Tex. and other points. Meals will be served on the special car at net cost. No such arrangements for a luxurous trip at so slight an expense have ever been offered. Applications for space in this car should be made at the earliest moment possible. For further information, maps, time-tables, etc., address, John E. Ennis, D. P. A., Mo. Pac. Ry., No. 199 Clark St., Chicago, Ill.

WANTED.—Will pay 10 cents per copy for the following numbers of THE JOURNAL: Vol. 2, No. 4, Jan. 26; No. 19, May 2, 1884. Vol. 5, No. 2, July 11; No. 3, July 18, 1885. Vol. 6, No. 6, Feb. 6, 1886. Vol. 15, No. 1, July 5; No. 4, July 26; No. 5, Aug. 2; No. 11, Sept. 13; No. 13, Sept. 27, 1890. Vol. 16, No. 1, Jan. 10; No. 2, Jan. 17; No. 3, Jan. 24, 1891. Vol. 17, No. 3, July 18, 1891.

OFFICIAL LIST OF CHANGES in the Stations and Duties of Officers Serving in the Medical Department, U. S. Army, from October 22, 1892, to October 28, 1892.

Capt. Freeman V. Walker, Asst. Surgeon U. S. A., granted leave of absence for one month, to take effect on arrival of First Lieut. George D. De Shon, Asst. Surgeon U. S. A., at Ft. D. A. Russell, Wyo.

First Lieut. George D. De Shon, Asst. Surgeon U. S. A., is relieved from duty at Columbus Bks., Ohio, and will report in person to the commanding officer, Ft. D. A. Russell, Wyo.

Capt. Eugene L. Swift, Asst. Surgeon, so much of S. O. 230 as relates to change of station, is suspended until further orders, and he is granted leave of absence for one month, on account of sickness, with permission to apply for an extension of one month.

Major John C. J. Happersett, Surgeon U. S. A., is relieved from duty at Ft. Custer, Mont., and will report in person to the commanding officer, Ft. Keogh, Mont., for duty at that post, relieving Major Philip F. Harvey, Surgeon. Major Harvey, on being relieved from duty by Major Happersett, will repair to West Point, N. Y., and report in person to the Superintendent of the U. S. Military Academy, for duty at that post, relieving Major Henry McElderry, Surgeon. Major McElderry, on being relieved by Major Harvey, will repair to Omaha, Neb., and report in person to the commanding General, Dept. Platte, for duty as attending surgeon and examiner of recruits at Omaha.

First Lieut. Allen M. Smith, Asst. Surgeon U. S. A., is relieved from further duty at Ft. Assiniboine, Mont, and assigned to duty at Ft. Custer, Mont., where he has already been ordered to temporary duty.

Capt. Edward R. Morris, Asst. Surgeon U. S. A., is relieved from duty at Ft. Custer, Mont., and will report in person for duty to the commanding officer, Ft. Warren, Mass., relieving Capt. Peter R. Egan, Asst. Surgeon U. S. A. Capt. Egan, on being relieved by Capt. Morris, will report in person to the commanding officer, Ft. Custer, Mont., for duty at that post.

First Lieut. William E. Purviance, Asst. Surgeon U. S. A., is relieved from duty at Jefferson Bks., Mo., and will report in person to the commanding officer, Ft. Sherman, Idaho, for duty at that post, relieving Capt. William W. Gray, Asst. Surgeon. Capt. Gray, on being relieved by Lieut. Purviance, will report in person to the commanding officer, Ft. Schuyler, N. Y., for duty at that post.